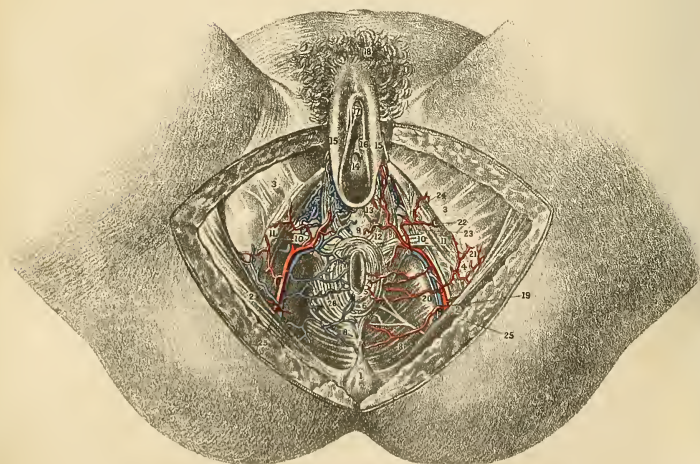
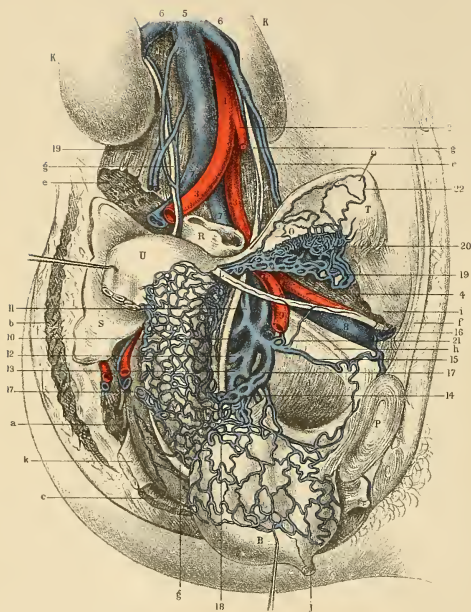




549

# FRONTISPIECE.





## DESCRIPTION OF FRONTISPIECE.

### SIDE VIEW OF THE FEMALE PELVIS (FIG. 1).

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>♂. Bladder (turned down).</li> <li>R. Rectum.</li> <li>L. Round ligament.</li> <li>U. Uterus.</li> <li>O. Ovary.</li> <li>V. Vagina.</li> <li>S. Sacro-iliac synchondrosis.</li> <li>K. Kidney.</li> <li>T. Fallopian tube.</li> <li>P. Pubic symphysis.</li> <li>a. Piriformis muscle (cut).</li> <li>b. Gluteal muscles.</li> <li>c. Coccygeus muscle.</li> <li>d. Obturator internus.</li> <li>e. Psoas magnus.</li> <li>f. Linea alba.</li> <li>g, g. Ureters.</li> <li>h. Obturator nerve.</li> <li>i. Internal abdominal ring.</li> <li>k. Great sacro-sciatic ligament.</li> <li>1. Abdominal aorta.</li> </ul> | <ul style="list-style-type: none"> <li>2. Inferior mesenteric artery.</li> <li>3, 3. Common iliac arteries.</li> <li>4. Left external iliac artery.</li> <li>5. Vena cava inferior.</li> <li>6, 6. Renal veins.</li> <li>7, 7. Common iliac veins.</li> <li>8. External iliac vein.</li> <li>9. Internal iliac artery (cut).</li> <li>10. Gluteal vein.</li> <li>11. Ilio-lumbar vein.</li> <li>12. Lateral sacral vein.</li> <li>13. Sciatic vein.</li> <li>14. Pudic vein.</li> <li>15. Obturator vein.</li> <li>16. Epigastric vein.</li> <li>17. Uterine veins.</li> <li>18. Vesico-vaginal veins.</li> <li>19. Ovarian veins.</li> <li>20. Bulb of the ovary.</li> <li>21. Vein to round ligament.</li> <li>22. Fallopian veins.</li> </ul> |
|---|--|

### FEMALE PERINEUM AND ISCHIO-RECTAL REGION (FIG. 2).

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. Coccyx.</li> <li>2. Gluteus maximus.</li> <li>3. Fascia lata, inserted into pubic arch.</li> <li>4. Tuberosity of ischium.</li> <li>5. Internal sphincter ani.</li> <li>6. External sphincter ani.</li> <li>7. Attachment of sphincter ani to coccyx.</li> <li>8. Levator ani, forming floor of ischio-rectal fossa.</li> <li>9. Perineum.</li> <li>10. Transversus perinei muscle.</li> <li>11. Erector clitoridis.</li> <li>12. Constrictor vaginae.</li> <li>13. Glands of Bartholini.</li> <li>14. Urethral opening.</li> <li>15. Labia majora.</li> </ul> | <ul style="list-style-type: none"> <li>16. Labia minora.</li> <li>17. Clitoris.</li> <li>18. Mons Veneris.</li> <li>19. Internal pudic artery.</li> <li>20. External hemorrhoidal artery. (The three arteries of this name are shown, the middle one only being marked.)</li> <li>21. Superficial perineal artery. (Supplying anus, perineum, vaginal lips, and erector clitoridis)</li> <li>22. Transversus perinei artery.</li> <li>23. Deep branch of internal pudic artery.</li> <li>24. Artery of the bulb (arteria bulbosa).</li> <li>25. Internal pudic vein (common).</li> <li>26. External hemorrhoidal vein. (Other branches of the same vessel not marked.)</li> </ul> |
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# AN AMERICAN TEXT-BOOK OF GYNECOLOGY,

MEDICAL AND SURGICAL,

FOR

PRACTITIONERS AND STUDENTS.

BY

HENRY T. BYFORD, M.D., J. M. BALDY, M.D.,  
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EDITED BY

J. M. BALDY, M.D.

*SECOND EDITION, REVISED.*

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WITH 341 ILLUSTRATIONS IN THE TEXT, AND 38 COLORED  
AND HALF-TONE PLATES.

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1898

TO THE  
MEDICAL PROFESSION OF AMERICA,  
BY  
THEIR CO-WORKERS,  
THE AUTHORS.



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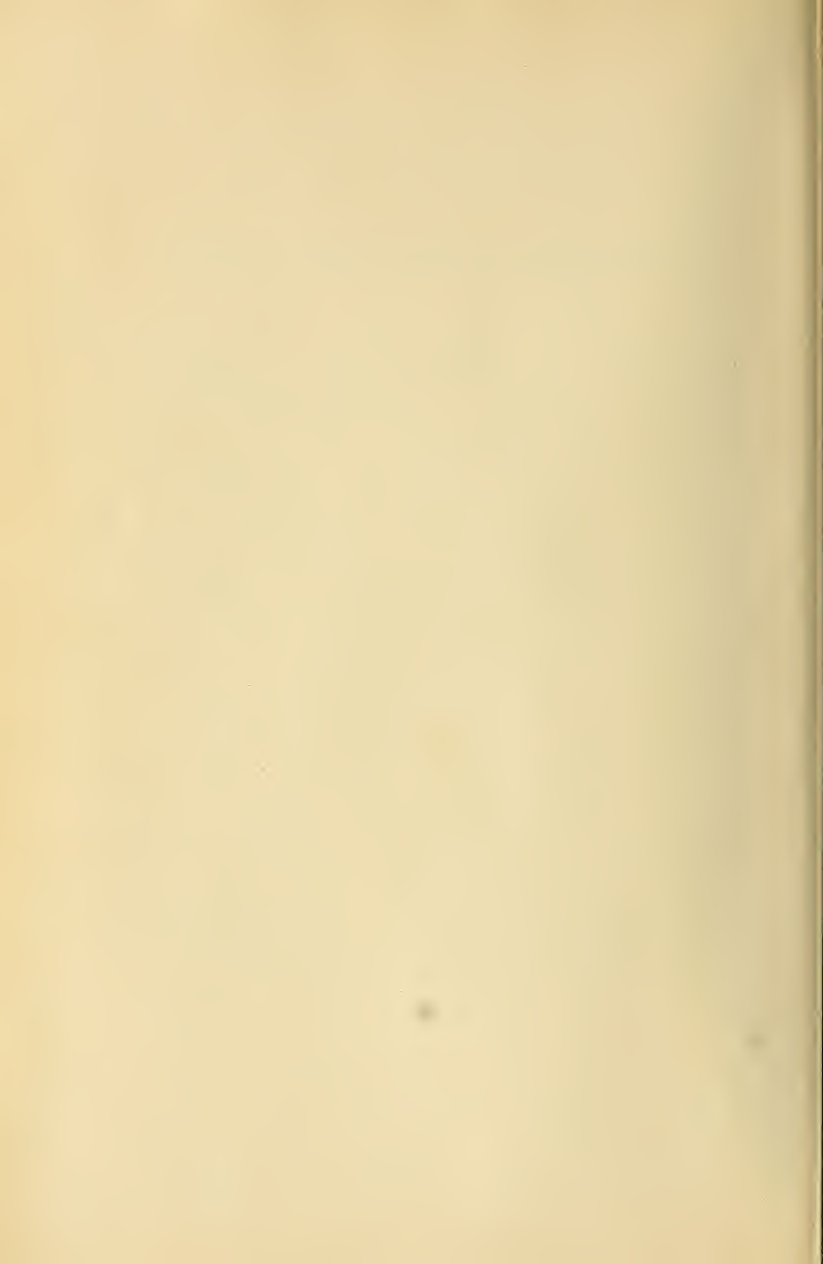


## PREFACE TO THE REVISED EDITION.

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IN offering a revised edition of this book to the profession it has been our aim to render it as nearly complete as is consistent with a clear enunciation of the practical working of gynecology. Much new material has been added, and some of the old eliminated or modified. This has been necessitated by the very rapid improvements in methods and details during the past four years. A large number—more than forty—of the old illustrations have been replaced by new ones, all of which add very materially to the elucidation of the text; they picture methods, not specimens. The descriptions of the preparation for each operation and the after-management of patients have been relegated to the chapters on Technique and After-treatment. This has of course entailed a very considerable enlargement of these chapters, but has relieved the body of the book from continued repetition. It has been found necessary to rearrange much of the material. The chapter on the Bladder, Urethra, and Ureters is extensively altered. The portions devoted to plastic work have been so generally improved as to be practically new. Hysterectomy, both abdominal and vaginal, has been re-written and more freely illustrated. All descriptions of operative procedures have been carefully revised and fully illustrated. The editor feels grateful to the profession for the considerate reception of the first edition, and hopes for an equally favorable one for the second. He has profited by kindly criticisms, and in the revision, making allowances for honest differences of opinion, has followed suggestions as far as he has felt them compatible with clear teaching.

J. M. BALDY.



## PREFACE.

---

THE rapid and progressive advances in the science and art of Gynecology during the past dozen years have created an almost constant necessity for the revision of works on this subject. For this reason, and for the purpose of presenting gynecological surgery and treatment as it is practised in America, the country of its birth and of its most substantial improvements and progress, the present text-book has been prepared by American authors, all of whom are teachers of this branch of surgery in the leading medical schools and hospitals. It is thoroughly practical in its teachings, and is intended, as its title implies, to be a working text-book for physicians and students. Many of the most important subjects are considered from an entirely new standpoint, and are grouped together in a manner somewhat foreign to the accepted custom. Several new chapters have been added, such as Technique and After-treatment, it being hoped that by this presentation of the subject the student might the more readily be aided in an intelligent understanding of their details. Illustrations have been depended upon in great measure to demonstrate and explain the anatomy of the parts considered—a method of dealing with the subject which has relieved the text of much irrelevant and cumbersome matter.

The work embodies as nearly as possible the combined opinions of all the authors, although it is to be understood that each individual author must be free from absolute responsibility for any particular statement: especially is this so for the reason that the Editor has endeavored by adding to and subtracting from the text to render it as uniform in its statements as possible.

All extraneous matter and discussions have been carefully excluded, and the attempt has been made to allow nothing unnecessary to cumber the text, which is brought fully up to date at every point.

The subject-matter of this work has been enforced by illustrations wherever opportunity presented. A large proportion of these illustrations are original, and are mostly reproduced from photographs or from fresh specimens. A considerable number of woodcuts and several half-tone and colored plates have been taken from other authors, and are credited to them in the List of Illustrations.

The Editor desires to thank Dr. Frank W. Talley for his careful revision of the proof-sheets, for his preparation of the Index, and for his valuable aid in other ways, and to express appreciation of the efficient and ever-ready co-operation of Mr. W. B. Saunders.

J. M. BALDY.

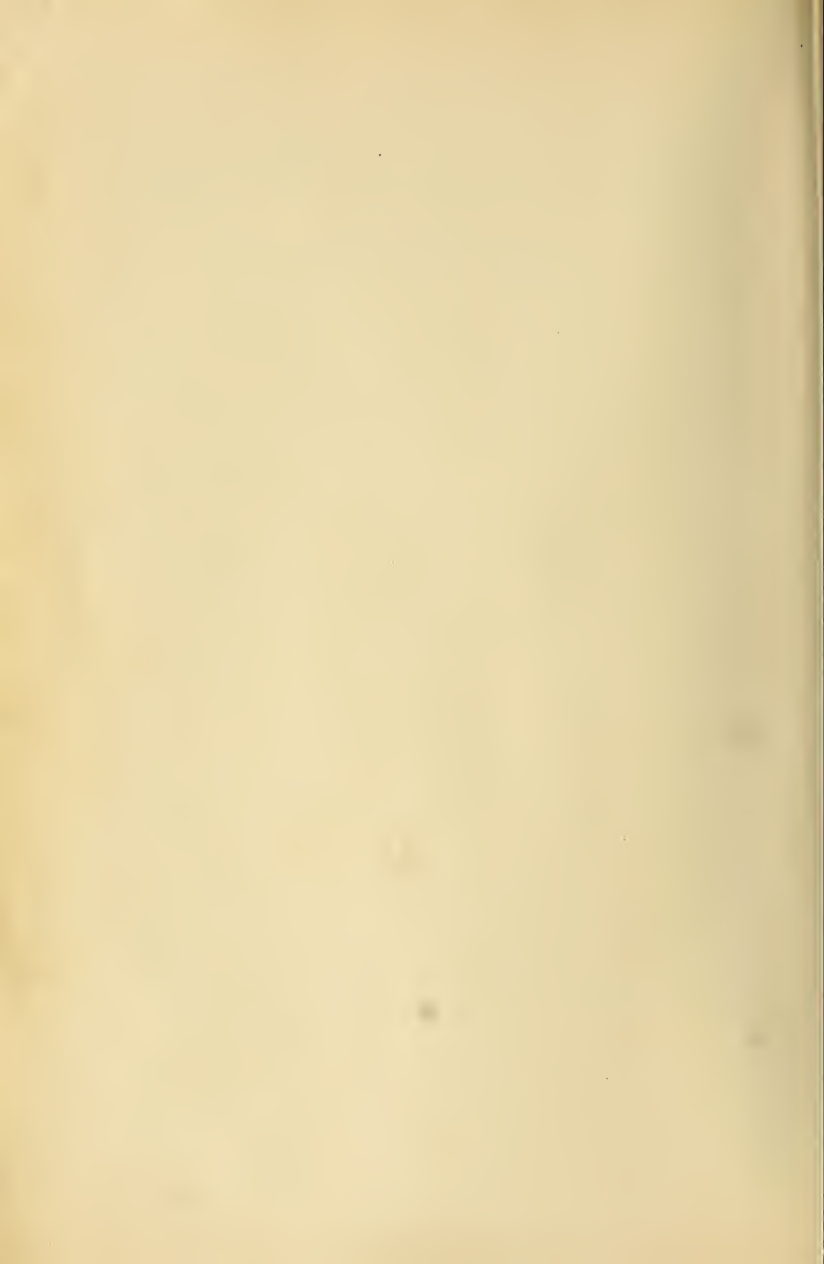
PHILADELPHIA, Dec. 1, 1893.



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# AN AMERICAN TEXT-BOOK OF GYNECOLOGY.

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## EXAMINATION OF THE FEMALE PELVIC ORGANS.

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IN making an examination for disease of the female pelvic organs the first thing for a physician to do is to acquire the confidence of the patient, it being presupposed that he possesses an adequate knowledge of all known physiological and pathological conditions of these organs. An untidy office, a dirty hand, a careless manner, and a rough demeanor are as inimical to his success as is the lack of knowledge and training in gynecology. The fear of the patient that she may become infected by filth, be hurt by manipulation, or be neglected through carelessness is often sufficient to deter her from undergoing a treatment which is, under the most favorable circumstances, a distasteful and onerous undertaking. He should remember that the patient comes prepared to sacrifice all preconceived notions of modesty to his dictum, and does so with the full belief that he possesses the refinement of a gentleman and the acquirements of a scholar.

He must not be impatient if she commences talking first of other parts of the body, avoids complete explanations of certain symptoms, or is a little dilatory in submitting to the necessary examinations. On the other hand, he should never abate in his deference to a woman who, having once submitted to gynecological treatment, conducts herself toward him with that familiarity and trustfulness which the sacredness and dignity of his calling inspire.

If she chooses to talk of her ailments, it is well to listen attentively to the recital until satisfied that they are of pelvic origin, when the physician may begin by appropriate questions to obtain a systematic description of her case. The data should be entered in

a case-book in the following order: Name; age; whether married or not, and if so, how long and whether more than once; number of confinements, with dates of first and last, and number and dates of abortions; her occupation and habits, whether sedentary or active; age of first menstruation, and how regular since then; whether menstruation is painful or not; when the pain commences and stops, and where it is felt and what its character; the length of time the flow lasts, whether profuse and clotted, or scanty, or prolonged by recurrence after cessation for a few hours or days; amount and character of discharge from vagina between the menstrual periods; the condition of nutrition as seen by the appearance of the tongue, conjunctiva, and skin; and the state of the nervous system.

Having obtained these facts, and others that may be acquired during the questioning, he will have a foundation upon which to construct an accurate diagnosis. The patient may be allowed to relate her special symptoms, or he may inquire for the various ones that accompany the disorders under consideration, or he may ask for special symptoms of whatever disease the knowledge already acquired leads him to expect.

He should always carefully differentiate between conditions which are of such gravity and long standing as to call for an examination, and those which are temporary and may be relieved by general treatment.

The functions of the kidneys, bladder, bowels, and rectum should be inquired into, as well as the effect of exercise or quiet upon her symptoms. A qualitative and quantitative analysis of the urine and an examination of the heart should be made in very fleshy or anemic patients, and also in those presenting symptoms referable to the abdomen and chest.

#### PREPARATIONS FOR AN EXAMINATION.

Although the examination in most cases can be made without preparation of the patient and at the first interview, yet when there is any difficulty in arriving at an accurate diagnosis it is well to have her return upon another occasion properly prepared. Such preparation should consist in mild purgation upon the previous day, and a soapsuds enema on the morning of the examination. The diet on the same day should be light, and the bladder be evacuated immediately before the examination.

When the examination is made at the patient's house, a sofa without arms may be drawn near a window, and stools placed at the end for the feet, or a table may be used, with chairs for the feet. If more convenient, the patient may sit on a pillow placed at the edge of a bed, and may lie back with her feet on chairs placed two feet apart. The corset and waist-bands should be loosened.

At the office the physician should be provided with a gynecological table, or a chair of simple construction that allows of elevating or depressing the shoulders or that can be made perfectly flat. Stirrups should be attached, so arranged that the feet can be elevated, depressed, or separated to any required extent, and held near the body or some distance away.

The end of the chair or table should be toward and near a window. Between it and the window, and at the right hand of the operator as he sits facing the chair, should be placed a cabinet or stand with drawers for holding instruments, medicine, and appliances. A stationary washstand should be near. By thus having everything convenient, one works easily and rapidly and saves time to himself and trouble to the patient.

A sheet should always be at hand to throw over the patient as she lies down.

#### POSITION OF PATIENT.

For ordinary pelvic examinations the patient should be put on her back, with the hips at the edge of the chair or table, facing the window, the feet being supported in the stirrups on a level with her hips, and far enough apart to allow ample space between them for the physician to work, and far enough from the patient's body for her comfort. Generally the head and shoulders should be slightly higher than the hips. In special instances we may elevate the shoulders and feet in order to secure greater abdominal relaxation. This is called the dorsal position. It is the best position for the digital and bimanual examinations, and is often employed for ordinary treatment on account of its convenience.

A digital examination may be made in the *Left Lateral* or *Sims' position*. The patient is placed upon her left side with the hips at the left-hand corner of the table, and both knees drawn up as far toward the chest as possible. The left arm should be drawn back behind her, and the right or upper knee drawn a little farther up and over the left until it almost touches the table, in order that the

patient may be tipped on her left breast. Care must be taken to keep the knees well flexed. It is better to have the foot of the table a little higher than the head.

This position has the disadvantage that the upper pelvic organs are not so easily reached as in the dorsal, either for a digital or a bimanual examination. For inspection of the vaginal fornices, tamponment of the vagina, and operations upon the cervix and anterior vaginal wall it is in America and in England the favorite position.

The *Knee-chest* position requires that the patient kneel near the edge of the table, and, with arms thrown back and head turned to one side, allow the chest to sink down on the table just in front of the knees. The thighs are flexed on the abdomen. The chest is lower than the pelvis, and when air is allowed to enter the vagina the uterus sinks away from the vaginal entrance. This peculiarity is shared by the lateral position. For altering the position of the pelvic organs and for vaginal tamponment this position is useful, but it is not desirable for ordinary examinations.

The *Trendelenburg* position is obtained by placing the patient on her back and raising the lower end of the table, thus elevating the pelvis and thighs and allowing the legs to fall over the edge. Its chief advantage is for operations upon the pelvic organs by abdominal section. The abdominal viscera recede from the pelvis, and leave the pelvic peritoneal cavity open to inspection through the abdominal incision. It is not often employed for examinations per vaginam. The accompanying cuts illustrate this position as obtained by the use of Krug's frame, which can be fastened to any table.

The *Upright* position, which gives information as to the position of the pelvic organs while the patient is up and about her duties, is chiefly useful in determining the extent of displacements. In this position the patient stands against some supporting object with the feet separated, while the physician kneels on one knee in front of her.

#### METHODS OF EXAMINATION.

There are three methods of examination: the ocular, the manual or digital, and the instrumental.

*Ocular Examination.*—If the symptoms point to a disease of the vulva or vagina, the patient is placed in the dorsal position, covered

with a sheet, the skirts pushed up over and beyond the knees, and the sheet pushed back between the limbs over the mons Veneris, so as to expose the vulva and perineum. The external parts and vaginal entrance are then inspected, and the finger is introduced as far into the vagina as necessary.

*Digital Examination per Vaginam.*—For this examination the best position is the dorsal. If the symptoms point to intrapelvic disease, it is best not to expose the patient at first, but pass the partly-closed hand under the sheet and along the inside of the thigh until the dorsal surfaces of the fingers gently touch the perineum or vulva. The position of the labia majora will be immediately recognized and any abnormal condition detected. The dorsal surface of the index finger is gently pushed between them until arrested in the vaginal entrance. The finger is then extended, and the finger-end glides over the perineum into the vagina. Any peculiarity of the hymen, obstruction from a vaginal tumor or prolapsed organs, or gaping of the parts from relaxation or laceration will be forced upon the attention, either by the difficulty or the unusual ease of the manœuvre. When there is much deviation from the normal, the parts may be exposed to view at once, otherwise the ocular inspection and external manipulation are better left until the internal examination has been made.

After the finger has entered the vagina the posterior wall, or rectum which lies under it, will attract attention if abnormal. If not, the finger is turned, palmar surface upward, and slight pressure against the anterior vaginal wall is made to detect enlargement, displacement, or tenderness of the urethra and bladder or organs above them.

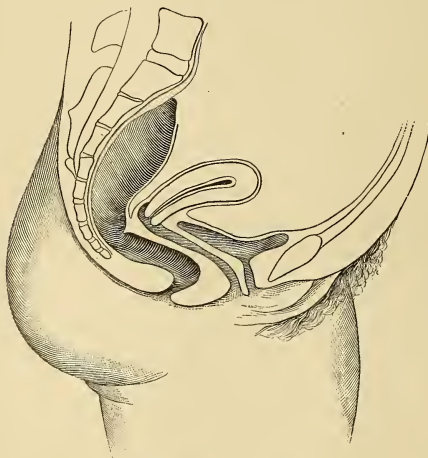
Having thus gone over the parts about the vaginal entrance, the objective point should always be the cervix uteri. It should be found from two and a half to three inches from the pubic arch, so that when the finger touches the cervix and is raised up against the anterior vaginal wall, the subpubic ligament will press against the finger between the second and third joints. The finger-end is swept around the cervix to discover if the fornices are diseased or encroached upon by surrounding abnormal tissue. Very often one lateral fornix is narrower than the other, and by pressing straight outward laterally the distance of the pelvic wall will be found to be less on that side, and lateral displacement will be detected.

The size, shape, and consistency of the cervix and the position



and shape of the external os—in fact, all changes except in color—are discovered in this way, and the diagnosis usually made before the speculum is used. The finger-end should press well up in front, behind, and to the sides of the cervix, in search of an ante- or retroverted or flexed fundus, adherent ovary or pelvic exudate. By pressing well back and laterally we can sometimes catch an

FIG. 1.



Normal Position of the Uterus.

enlarged or prolapsed ovary against the pelvic walls. The right hand should be used for palpating the right side of the pelvis, and the left hand for the left side.

Vaginal palpation of the ureters is easily executed in the dorsal position, and should always be practised. They are much more easily felt than might be supposed, because they are situated at the dividing-line between the soft, elastic parametric connective tissue and the firmer peripheral fatty connective tissue, at the lateral and front parts of the pelvis. The finger-end, pressed very gently upward in front of the cervix and drawn toward the pubes, feels, about half an inch in front of the cervix, the posterior edge or base of the trigone of the bladder, and then comes upon the firmer part of the anterior vaginal wall under the trigone. By repeating this forward and upward hooking motion of the finger-end, getting a little more to

one side each time, the same cord-like edge of the firmer tissue representing the ureter can be traced laterally and backward toward the sacro-iliac synchondrosis. During the earlier months of pregnancy, and in the presence of disease of the ureters, they are easily traced as large, somewhat tense cords, backward and outward to the pelvic walls.

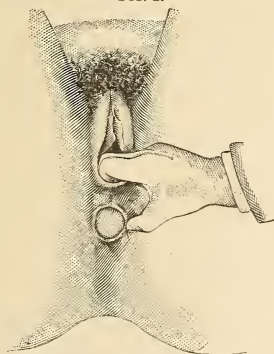
Two fingers may be used in the vaginal examination when it is desirable to reach farther than is possible with one. One finger is, however, generally to be preferred, because the touch is freer and more delicate and the inconvenience less to the patient.

By hooking two fingers backward toward the coccyx, and then strongly outward toward the anus, the anterior wall of the rectum may be everted, and its condition, as well as that of the anal rim, be revealed to the eye. This manœuvre is somewhat painful, and not always well tolerated by the patient. The finger and thumb of the other hand may with advantage push the tissues behind the anus backward, so as to increase the anal distension.

*Digital Examination per Rectum.*—In virgins, or other patients in whom the posterior pelvic wall cannot be reached or in whom conditions in the posterior half of the pelvis cannot be diagnosed through the vagina, rectal indagation gives valuable information.

As the rectum is dry and sensitive, the forefinger should be abundantly smeared with vaseline or some other unirritating fat,

FIG. 2.



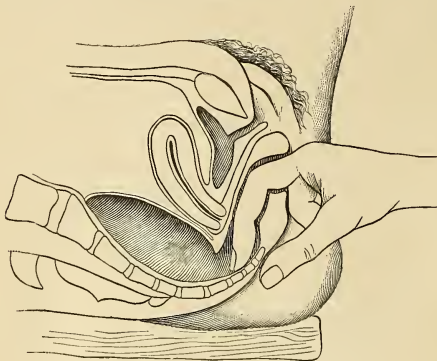
Digital Eversion of the Rectum.

and introduced, palmar surface down, in a forward direction until the finger-end has passed over the edge of the levator ani (rectal promontory), and then flexed a little until the whole finger is



introduced. Then it should be straightened and slowly rotated until the palmar surface can be used to palpate the anterior wall. Before rotating it is well to touch the coccyx, or even grasp it between the finger within and the thumb without. Fracture, anky-

FIG. 3.



Palpation of the Coccyx.

losis, unusual mobility, abnormal sensitiveness, or dislocation can be detected.

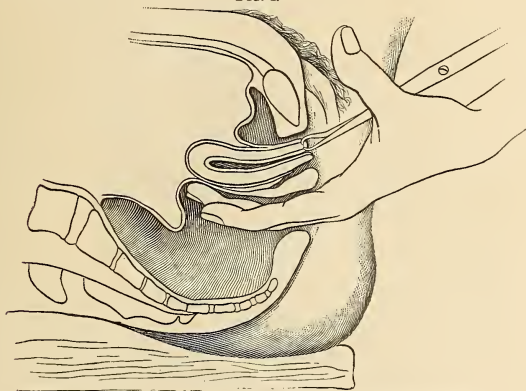
As soon as, or even before, the finger is rotated, the cervix, or, if there be retroflexion, the fundus uteri, will usually be detected within easier reach than per vaginam. The finger is then pressed on under the retroflexed or retroverted fundus, and readily detects an ovary or tube in the cul-de-sac of Douglas or any induration at the uterine horns. The retroverted fundus can be pressed upward, and any unusual resistance or bands of adhesions recognized. Appendages or tumors adherent to the lateral and posterior walls of the pelvis are easily felt. The connective-tissue fibres running from the cervix to the pelvic walls usually shut off the upper part of the pelvis from observation. In order to reach these higher parts the finger-end is pushed along against the sacrum, until it passes through a constricted part of the gut and emerges up behind the uterus, and between and over the sacro-uterine ligaments. It then has access to the lower abdominal cavity and can palpate the parts with distinctness. Usually, however, the anus is too sensitive or the finger too short to allow of a satisfactory exploration of this kind, and two fingers with the aid of anesthesia will be required.

The half or whole hand can be passed into the rectum and a complete intrapelvic exploration made. This, however, is apt to injure the sphincter ani and rectum, and is generally unnecessary, for the bimanual examination with two fingers in the rectum gives us the same information without it.

An accurate knowledge of anatomy, and a little practice, will enable us to palpate and recognize the pyriformis muscle and the sacral plexus of nerves lying upon it, the small sacro-sciatic ligament, the greater sciatic foramen, the various pelvic arteries, etc.

With the index finger in the rectum and the thumb in the vagina the cervix, or even the retroverted uterus, may be grasped and its size, mobility, and relations determined.

FIG. 4.



Rectal Palpation of the Uterus drawn down by a Vulsellum Forceps.

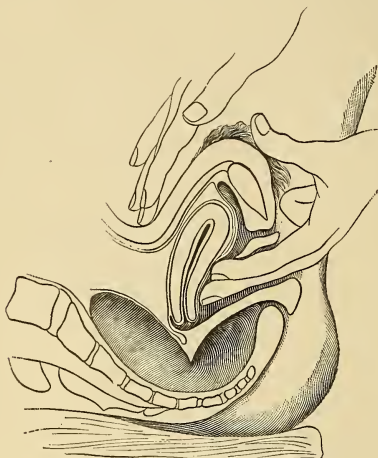
The fundus uteri and adjacent tissues may be rendered more accessible to the rectal finger by drawing the cervix to the vaginal entrance with a vulsellum forceps. (Fig. 4.)

#### THE BIMANUAL EXAMINATION.

In order to complete our information with regard to the pelvic organs it is necessary to make use of the bimanual examination. To do this we first inform ourselves of the position of the cervix, etc., by ordinary vaginal indagation, after which the other hand, previously placed over the pubes, presses gently, but with increasing firmness, upon the abdominal walls, sinking the finger-tips a little

deeper with each inspiration of the patient, until the uterus is felt to descend upon the vaginal finger (Fig. 5). The uterus is thus brought down until its anterior and lateral surfaces can be pal-

FIG. 5.



Bimanual Palpation of the Uterus.

pated through the anterior vaginal wall. By a series of gentle pushes from above and below the position, mobility, size, and shape of the uterus can be ascertained. Great gentleness must be observed not to hurt the patient nor to displace the organ before its position is determined. In case the fundus is not felt, the outside finger should be pressed into the abdominal walls a little higher up. When the abdominal walls are lax or the patient anesthetized, they can be depressed until the sacral promontory is felt. Then the fingers are brought downward toward the pubes until they are felt by the vaginal finger to touch and move the uterus. Under an anesthetic the retroverted uterus can be picked up between the fingers bimanually and replaced, or if adherent its mobility tested.

The uterus can be retroverted by hooking the cervix forward with the vaginal finger, and sinking the external fingers over the pubes and pressing toward the sacral promontory, and thus the posterior surface brought within reach.

By pressing well down beside the uterus until the fingers of both

hands touch with only the abdominal walls between, we may palpate the ovaries and tubes. If the ovaries are not easily recognized, the fingers of the two hands should be kept in contact and brought toward the pubes and Poupart's ligament, alongside the anteverted uterus, from the cervix toward the fundus. The first decided information is given by the sudden slipping of the ovarian ligament between the finger-ends, like a tense cord stretched across the field. By repeating this manœuvre a little further to the side, we come against the ovary, which if small may merely feel like a fusiform enlargement of this cord. The ureter may give a sensation similar to the ovarian ligament, but it feels less tense and is easily traced to the side of the pelvis by the vaginal finger, and thus differentiated.

FIG. 6.



Bimanual Rectal Palpation of the Pelvis.

The round ligament feels like a relaxed cord, and is only felt indefinitely. The normal Fallopian tube gives only a very indefinite sensation, as of a fold of membrane. When enlarged and occluded it usually curves backward over the ovary, and feels somewhat like a small fusiform or club-shaped tumor tapering toward the horn of the uterus. Extensive adhesions usually cause a matting together

of the appendages in a roundish or irregular-shaped mass, but little movable itself, and partially fixing the uterus.

With one or two fingers in the rectum the external (abdominal) and vaginal fingers may be approximated behind the uterus, and the condition of the posterior and upper parts of the pelvic cavity quite accurately ascertained.

FIG. 7.



Bimanual Recto-vaginal Palpation of the Uterus.

With a finger in the rectum and the thumb in the vagina grasping the cervix, while the fingers and thumb of the other hand grasp the fundus through the abdominal walls, the consistency, flexibility, size, mobility, and relations of the uterus can be appreciated with a surprising degree of ease. The displaced uterus can be grasped and replaced in this way.

In order to become an expert diagnostician the gynecologist should accustom himself to use either hand in the vagina or over the abdomen, that he may be able to reach both sides of the pelvis.

The bimanual examination of the uterus is of the utmost importance in the diagnosis of pelvic tumors. Ovarian tumors of moderate size are often entirely overlooked when they lie over and behind

PLATE VII.



Bimanual Palpation of the Pelvis.





the uterus, because they are not within reach of the vaginal finger. When, however, the abdominal walls are pressed down into the pelvis, not only is the tumor discovered, but its size, consistency, mobility, and the length of its pedicle are often recognizable. Tumors of the uterus can be mapped out in this way and their size and relations to the organ determined. Long-continued practice is necessary to render the beginner expert in these matters.

*Digital and Bimanual Examination in the Lateral Position.*—

Similar examinations may be made in the left lateral position with the left hand in the vagina or rectum and the right hand over the abdomen, but hardly as satisfactorily as in the dorsal position. However, it gives one a better comprehension of the mobility and relationship of the organs to examine in both positions and compare results.

#### ANESTHESIA.

In many cases, even after a thorough evacuation of the bowels, the tension of the abdominal walls, the sensitiveness of the organs, or the complications in the pathological conditions render a satisfactory examination impossible. In such cases the administration of an anesthetic not only renders all of the methods described available, but the relaxation of the tissues enables us to employ them without force and without fear of causing that feeling of soreness and discomfort that sometimes follows a thorough examination without the anesthesia. When there is the slightest doubt as to the pathological condition, the patient should always be anesthetized for the examination.

#### EXAMINATION OF THE VAGINAL ENTRANCE.

An ocular examination of the vaginal entrance will reveal the condition of the superficies, but it will be incomplete unless aided by the educated touch. If a laceration is mostly external, its extent is much better appreciated if the finger be introduced into the anus and the thickness of the perineal body palpated between the finger and thumb. The scar-tissue may be blanched and made plainly visible by pulling out the tissues with the finger in the anus, so as to stretch the perineal body. If the fourchette be intact, the extent of internal deficiency due to laceration may be measured by pressing the finger down along the pubic rami within the vulvo-vaginal entrance. Normally, the levator vaginæ so stretches around



the vaginal entrance as to prevent palpation of the pubic ramus except by quite firm pressure. When the fibres of this muscle are torn, the anterior sulci beside the urethra are widened and the bony surfaces easily felt. The vaginal entrance, instead of being ovoid or roundish, is bounded posteriorly by the V-shaped edge of the levator ani, with the rectum passing over it filling the angle and leaving a sulcus on either side. When the transversus perinei is torn, the finger readily traces the bony surfaces of the pubic rami down to a level with the anus on the side of the tear. When the sphincter is torn, the anterior edge of the anus is thin and cicatricial, and the dark-red edges of the rectal mucous membrane are visible, often giving an ulcerated appearance to the novice.

#### INSTRUMENTAL EXAMINATION.

*The Uterine Sound.*—Various forms of uterine sounds have been devised. The most serviceable ones are Simpson's and Sims'. They are about 30 cm. long, and from 2 to 3 mm. in diameter, with a slightly enlarged bulbous end. The end toward the handle is somewhat thicker. Simpson's sound, formerly stiff, is now made of a somewhat flexible metal, and has a mark indicating the normal length of the uterine cavity ( $2\frac{1}{2}$  inches, or 7 cm.); Sims' sound is a trifle lighter and much more flexible than Simpson's. They should be made entirely of metal. Jenks' spiral sound and Thomas's whalebone or hard-rubber probe are useful forms, because they adapt themselves to the curve of the uterine canal. On account of their elasticity they do not retain its curve. Uterine probes resemble the sound in shape, but are more delicate, and are useful in exploring a distorted uterine cavity.

*To Introduce the Sound,* the cervix should be located with the index finger, and the sound, about seven centimeters from its point, bent at an angle of about forty-five degrees, and introduced along the palmar surface until the bulbous end passes into the cervical canal. By depressing the handle and, if necessary, drawing the cervix slightly forward either with the finger, the sound, or a tenaculum, the instrument easily passes to the fundus. No force must be used, but the curve of the sound changed again and again, if necessary, until it passes easily. By giving it a sharper curve with a counter-curve near the handle we often succeed better in making it pass a more acute flexure.

The digital or bimanual examination will generally enable us to

determine what the angle or curvature of the sound must be. A narrowness of the internal os, due to uterine flexion or spasmodic contraction, sometimes interferes with the passage of the sound and may render it painful. In such cases much force should not be used, but the attempt postponed until an examination by the speculum is made.

*The Uses* of the sound consist in ascertaining the patency of the uterine canal, its direction, length, size, and sensitiveness. In connection with the abdominal palpation we can also determine in what part of the uterus the enlargement or tumor is located. The mobility of the uterus and its connection with the pelvic organs, or its independence of them, can sometimes be more accurately determined than by the ordinary bimanual examination alone.

*The Dangers* in the use of the sound are the introduction of septic matter into the uterus, the lighting up of an old endometritis or pelvic inflammation, and the perforation of the uterine walls.

It is better, when practicable, to use the sound through the speculum after the vaginal fornices and cervix have been wiped out dry with absorbent cotton, and then swabbed out with a 5 per cent. solution of carbolic acid. When, however, it is necessary to use the sound without the speculum, the vagina should be thoroughly douched out with a 1:2000 solution of bichloride of mercury. The sound should be kept scrupulously clean, and be dipped in a 5 per cent. carbolic solution the last thing before its introduction. The spiral sound should be boiled after use in every septic case, and only used when the other sound does not give the information sought.

The softened uterine body has been perforated many times by the sound without serious results. In such cases the instrument passes almost its entire length, and can be felt bimanually through the abdominal walls. The only danger consists in carrying sepsis into the peritoneal cavity—not a very serious one if the proper antiseptic precautions have been taken.

It has occasionally happened that the sound has passed into a Fallopian tube. This is especially liable to occur in a uterus bicornis, and does no harm unless force is used or sepsis introduced. It is best never to use a sound where it is possible to gain the desired information by other means. In all but exceptional cases this may be easily accomplished, and consequently the use of the sound has in great part been dispensed with.

## THE UTERINE ELEVATOR.

Another important, although at the present day infrequent, use of the sound is as a uterine elevator to replace the retroverted uterus. It has been variously modified, so that the angle can be changed

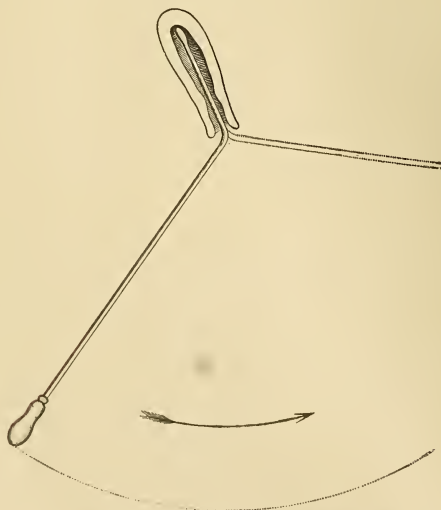
FIG. 8.



Sims' Uterine Elevator.

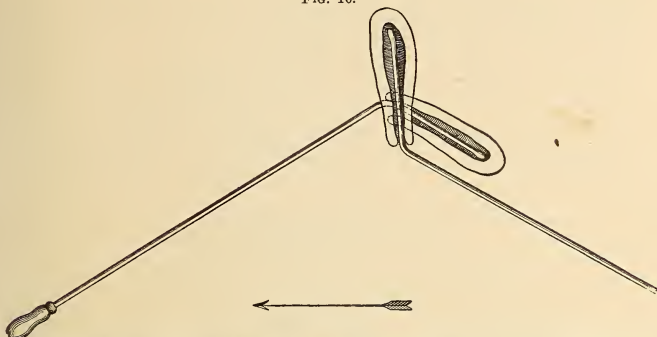
by a screw or appliance on the external end. Such modifications are, however, objectionable, in that it is impossible to determine just how much force is being used, and whether or not the endometrium and uterine walls are being injured. By giving the uterine sound a proper curve and sweeping the outer end around a circle, the fundus can be elevated and the amount of resistance used easily gauged, and the use of much force avoided.

FIG. 9.



Replacement of the Uterus with the Sound. Upward curve of the handle without altering the position of the uterus. First motion.

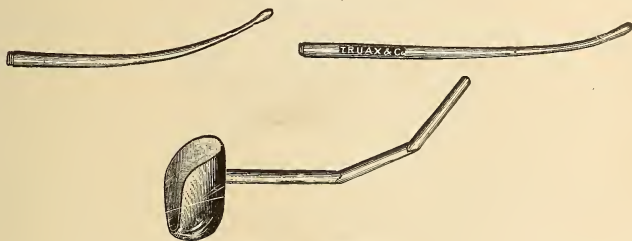
FIG. 10.



Replacement of the Uterus with the Sound. Depression of the handle so as to tip the fundus upward and forward. Second motion.

Byford's elevator, made by cutting off the sound at its point of

FIG. 11.



Byford's Uterine Elevator.

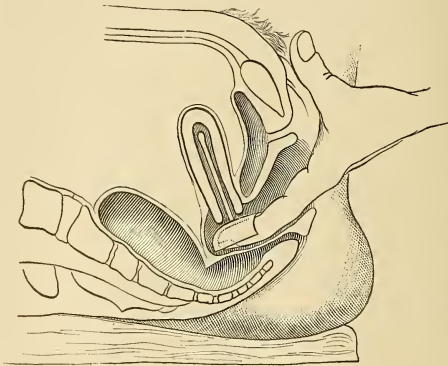
emergence from the uterus and placing a finger-cap upon it at right angles, gives the requisite accuracy and delicacy of touch. It is introduced and the cap pushed in the direction opposite to that the fundus is to take. When the fundus rises high in the pelvis the finger readily slips into the cap and is held there by atmospheric pressure. The long axis of the sound and long axis of the finger are at right angles to each other, and thus the position of the fundus always known.

#### THE SPECULUM EXAMINATION.

The methods already described will usually suffice for ordinary diagnosis, but when an ocular inspection, local treatment, or plastic operation becomes necessary, a speculum must be used.

The simplest and most nearly allied to a perfect exposure of the parts is obtained by the use of a perineal retractor, in the lateral or Sims' position. When the patient is sufficiently turned on the breast and the perineum drawn back, the uterus and anterior vaginal wall sink away from the outlet and leave all the interior of the vagina exposed to view except the part covered by the instrument. If the patient be tightly laced or not sufficiently turned on the chest, the

FIG. 12.

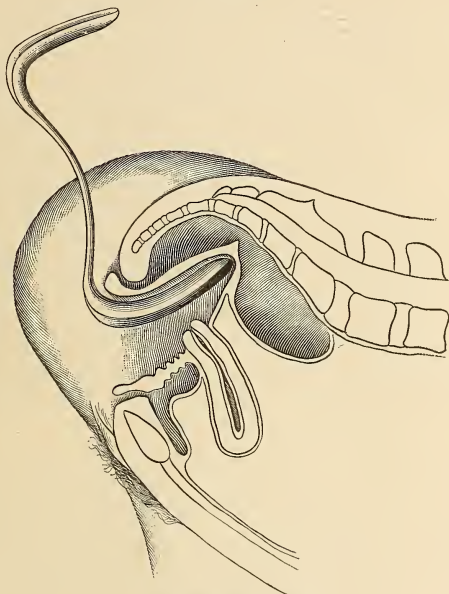


Action of Byford's Uterine Elevator.

anterior vaginal wall will not be drawn far enough up behind the pubes. We may then have to use a depressor to push it out of the way. If we wish to get a closer view of the cervix, we can draw it nearer to the pubes by means of a tenaculum. This is also useful in steadying the cervix for the introduction of the sound. The uterine dressing forceps, of which a great variety have been devised, are invaluable in enabling us to wipe out the cervical mucus and disinfecting the vaginal fornices before using the sound. When the mucus is too thick and tenacious to be wiped off, we can coagulate it by repeated applications of astringents or soften it with strong alkaline solutions. For making uterine applications, uterine applicators and intra-uterine syringes have been devised. The applicators usually consist of a flattened piece of flexible metal, preferable silver, or a silver probe flattened on the end and without any bulbous or other enlargement. A small flat piece of common cotton is wound tightly around it, dipped into the solution, and passed into

the uterine cavity as far as desirable. Common cotton is preferable, as the medicines to be applied do not soak through it quickly, so as

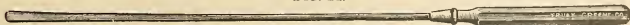
FIG. 13.



Sims' Speculum Introduced.

to corrode the instrument before it can be removed. The syringe is made of hard rubber, and is used by being introduced to the fundus of the uterus and the contents injected into the uterine cavity.

FIG. 14.



Uterine Applicator.

Vaginal tampons are easily introduced and adjusted in the Sims' position, for the vagina is expanded and the uterus is well up in the pelvis.

*The Introduction of the Perineal Retractor* requires some explanation. The double retractor, or Sims' speculum, is the one ordinarily used. After throwing a sheet over the patient the clothes



are pushed up, the edge of the sheet tucked under the right or upper thigh, and the lower one, unless covered by the patient's drawers, is covered by a napkin. The speculum is grasped in the right hand with the index finger along the concavity of the blade, and pushed into the vagina with the convexity and handle toward the sacrum, while the labia are held apart with the fingers of the left hand. The end of the blade is passed well back toward the hollow of the sacrum, and the perineum drawn away from the urethra so as to open up the vagina. An assistant then grasps the shaft of the retractor in his right hand, the thumb resting against the under surface of the outer blade, and with the left hand holds the nates up to the edge of the speculum. The left forearm of the assistant should rest upon the patient's hip, while the right elbow and forearm rest against his own body. This ensures against unsteady traction and early tiring on the part of the assistant.

The objection to the use of Sims' speculum in ordinary office practice is the necessity of having an assistant. Many ingenious modifications and appliances have been devised to retain the retractor, but as these require the use of a belt or shoulder-strap, their application is time-consuming and troublesome.

On account of these objections the Sims speculum has not been able to displace the self-retaining bladed specula that are used in the dorsal position. For inspection of the cervix and the ordinary local treatment at the office the bivalve instruments answer quite well. Through them the mucus can be wiped out, the fornices disinfected, the sound passed, the cervix dilated, intra-uterine applications made, and tampons placed.

Two or three sizes or varieties are requisite to enable one to fit all cases. Among the best is Goodell's.

The cylindrical speculum, formerly so popular, is now seldom used in America, as the exposure is too limited and the space within it too cramped. Fergusson's is the one usually found in the stores.

The right index finger first ascertains the position of the cervix, and is then held just within the vaginal entrance, while the thumb holds the right labium aside. The speculum is passed between the thumb and finger, with its upper blade laid diagonally on the right finger, until it passes into the vagina. As the speculum touches the vulva, the left middle finger should push the right labium well outward to prevent hairs or folds of the labia being



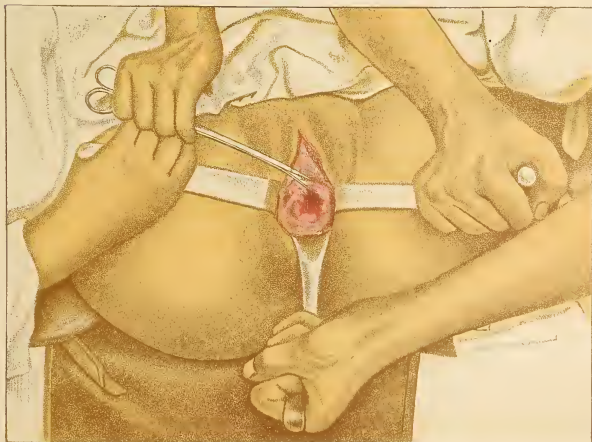
PLATE VIII

FIG. 1.



Exposure of the Cervix through Sims's Speculum.

FIG. 2.

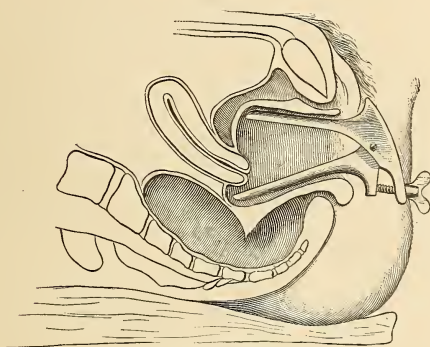


Dorsal Position showing use of Retractors.



dragged into the vagina. If such happens, a very slight separation of the blades of the speculum releases the parts. The instrument is then so turned that the lower longer blade lies flat against the perineum and is passed on under the cervix. As the blades are separated, the upper one comes up just in front of and exposes the cervix. With proper manipulation neither the sound nor tenaculum is ordinarily needed to bring the cervix within the field. The speculum should not be tightly closed when removed, for fear of pinching the labia or catching the hairs.

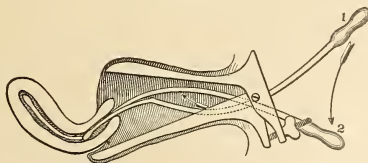
FIG. 15.



Bivalve Speculum Introduced.

The sound can ordinarily be passed into the uterus through the speculum without trouble, although in cases of ante flexion with a small cervix and vagina, the cervix will sometimes have

FIG. 16.



Passage of the Uterine Sound, in Case of Ante flexion with Retroversion.

to be hooked forward with a tenaculum. The greatest difficulty to the beginner consists in passing the sound in a case of ante flexion with retroversion.

This is, however, easily done by pressing the well-curved sound first toward the hollow of the sacrum, until arrested at the bend of the uterus, and then causing the handle to describe a semicircle, when the probe end will point upward; it will then readily pass to the fundus. It often seems to the beginner as if the sound had passed through a spiral or corkscrew canal. The same manœuvres, reversed, may be employed for sounding a sharply-retroflexed uterus.

In introducing tampons the cervix should be pushed in the direction it is to be held, and the tampons placed against or around it and held there by the forceps, until the speculum is partly withdrawn. When more tampons are needed they may be introduced and held until the speculum is withdrawn over them also. In ordinary treatment it is best not to use too many large tampons, since they over-distend the vagina and weaken its walls.

Examination in the dorsal position with vaginal retractors (Simon's method) is one of the most satisfactory methods, but usually requires the use of an anesthetic to display its advantages.

A broad perineal retractor holds back the perineum, and narrow ones keep the bladder or lateral vaginal walls out of the way. The cervix can usually be drawn down to the vulva by tenaculum forceps. Simon's retractors are seldom used in America on account of their cumbersomeness. Lighter modifications are more often employed.

The speculum and perineal retractor are not, strictly speaking, instruments of diagnosis, for they reveal nothing that the finger cannot diagnose, except the color of the cervix and the character of the secretions issuing from its canal. Sims' speculum is best adapted for local treatment and for minor operations; the bivalve speculum for local treatment.

*Dilatation of the Genital Tract for Examination.*—It often happens that a satisfactory examination is impossible on account of the narrowness of some portion of the genital tract. In virgins the hymen may not admit the fingers without great pain, and it may be necessary to make the first examination under anesthesia. In some cases we can succeed with local anesthesia by cocaine or by dilating the parts slightly and progressively at the first few sittings. We can sometimes introduce only the little finger (well lubricated) the first time. In two or three days the index finger may gain entrance, and the next time the smallest speculum. When we succeed

in getting in the speculum, it should be allowed to remain a few moments, then slightly expanded, and a small glycerin tampon pushed through it into the vagina and left for twenty-four hours. The next time a larger tampon should be left. After this the cervix may be exposed, and all difficulty will soon disappear. Similar manoeuvres may be made with the smallest-sized Sims' speculum. A virgin should, however, but rarely be examined. Should it become necessary, a rectal examination will usually answer all purposes, but if this is not found to be satisfactory, the patient should be first anesthetized.

Very often a conical, flexed, or imperfectly developed cervix will prevent examination and treatment of the uterine cavity. In such cases the cervix should be drawn forward by a strong hook or vulsellum forceps, and some form of tent or a dilator of small size gently forced into its canal. In some cases nothing can be made to enter without causing too much pain, except a slippery-elm tent but little larger than a crochet needle, whittled out of a fresh piece of slippery-elm bark, moistened in a 5 per cent. aqueous carbolic-acid solution, and slightly crushed in the jaws of the dressing forceps to render it flexible. After two or three such treatments larger ones can be passed, and finally a small dilator or a delicate block-tin sound bent at a proper angle. We will then be able to explore the cavity with a small curette for softened mucous membrane, débris of malignant growths, etc. Schultze has recommended the introduction of a piece of sterilized lint or gauze into the vagina, and its removal in a few hours for the purpose of examining the secretions adherent to it.

When a more extensive dilatation is required, the vagina and uterus may be thoroughly swabbed out with a 5 per cent. solution of carbolic acid or a 1 : 2000 solution of bichloride of mercury, and a long narrow strip of iodoform gauze pushed into the uterus until it fills the entire cavity and projects from the cervix, partly filling the vagina. This may be left for twenty-four hours, and replaced by a larger packing each day until the uterus becomes sufficiently dilated to admit the finger for palpation. These packings should be introduced at the patient's house or at a hospital, and the parts thoroughly disinfected before each packing. The packing should be examined each time for any abnormal secretion that may be found upon the uterine end. Unless the most perfect antiseptic precautions are assured, the packings should not be repeated many times,

for the mucous membrane becomes denuded of its epithelium and exceedingly susceptible to septic inflammation.

*Rapid Dilatation of the Uterus* for diagnostic purposes is usually made under anesthesia, for which either the Sims' or the dorsal method of exposing the cervix may be employed. The cervix is drawn forward and steadied by a strong hook or vulsellum forceps. Conical dilators of constantly increasing sizes may then be forced into the uterus until a large curette or a finger can be used to explore the cavity. It usually requires an hour or so to dilate wide enough for the introduction of the index finger. In America the bladed dilators are usually preferred. It is preferable to use two or three sizes of these, first introducing a Nott or Ellinger dilator closed, and expanding the blades until the canal is large enough to admit a larger instrument, such as Goodell's, which in turn is expanded. The dilators should be turned from time to time so as to stretch the cervix antero-posteriorly, as well as laterally, and thus secure a greater and more general relaxation. The blades of Ellinger's and Goodell's instruments remain parallel during expansion.

It is sometimes almost impossible to dilate the nulliparous cervix at a single sitting wide enough to admit the finger to the fundus without lacerating the cervix. Hence in some cases only a moderate dilatation is attempted, and this is followed up by the method of tamponment already described. After abortions, or when the uterus is enlarged by growths or relaxed by inflammatory action, wide dilatation is often quite easily and rapidly accomplished.

In other cases in which it is considered necessary to introduce the finger, an incision is made in front of the cervix, the bladder pushed up from its cervical attachment, and the anterior wall of the cervix is split as high as necessary. The incisions are sewed up immediately after the examination. This obviates the bruising of the cervix, yet the internal os and lower uterine segment may be so small that even this method fails to help us much. It is indeed seldom made use of for diagnostic purposes.

*Gradual Dilatation* by means of sponge tents, tupelo tents, lamina tents, cornstalk tents, etc. was a once popular method that has now fallen into disuse, except in isolated cases in which the other means cannot conveniently be employed.

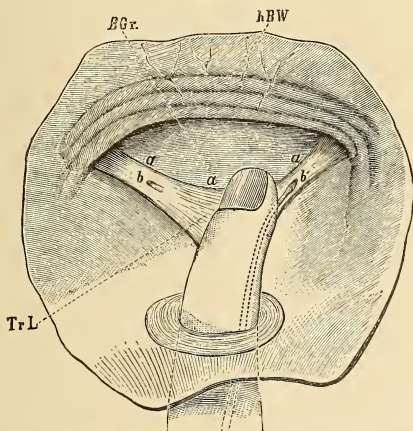
Sponge tents expand quite rapidly, but they abrade the mucous membrane and sink into the cervical folds, so that portions of them are apt to be left after removal. This, together with the



fact that two or three must be successively used to obtain sufficient dilatation, exposes the patient to great danger from sepsis. The mortality attending their use is great; the danger increases with each tent used. A 1 : 2000 bichloride vaginal douche should always precede their introduction and follow their withdrawal. They are best introduced in the lateral position by the aid of a Sims speculum, and should each be left in situ four or five hours.

Tupelo tents are firmer and expand more slowly and efficiently. They slip out easily, and must be kept in place by a vaginal tampon. The same accidents are liable to happen as in using sponge tents, and the same precautions must be taken.

FIG. 17.



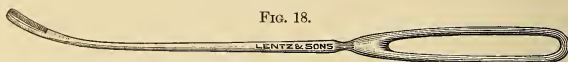
Palpation of the Interior of the Bladder. *BGr.*, *a a*, base of bladder; *b b*, mouths of ureters; *TrL*, interureteric ligament; *hBW*, posterior wall of bladder.

Sea-tangle or laminaria tents often expand unequally, with a constricted zone corresponding to the internal os, which renders their removal difficult.

*Dilatation of the Urethra* for digital examination and exploration of the bladder has been made use of frequently. The danger of incontinence of urine has, however, deterred many from attempting it, and unless an hour or more is taken for the procedure this accident is very liable to follow. Urethral sounds or dilators of graded sizes should be slowly and successively introduced until the little finger can enter the bladder.



The anterior uterine wall, ureteral mouths, and inner surface of the bladder can be explored. In conjunction with one hand over the abdomen an accurate bimanual examination of the anterior half of the pelvic cavity can be made. In view of methods of bladder examination described in the chapter on Urethra, Bladder, and Ureters, this practice is altogether unjustifiable.



Exploratory Curette.

*The Dull Curette* is used in scraping out retained secundines after abortion, or portions of intra-uterine malignant or adenomatous growths for macroscopical and microscopical examination. The sharp curette is, however, a much safer and more efficient instrument for this purpose. It can be used after moderate dilatation of the cervical canal. The small exploratory curette may be used for the same purpose, with the added advantage during its use of not being forced to dilate the cervical canal.

*The Exploratory Needle or Syringe* is a valuable aid in the diagnosis of pelvic abscesses or cystic tumors, when such aid is needed, which is of rare occurrence. It consists of a hollow needle or small trocar that can be attached to a syringe. After an antiseptic vaginal douche the patient is put upon her back, and the sterilized needle pushed into the tumor at a point in the disinfected vagina where no pulsating vessel can be felt. If the needle be a fine one, there will be little danger even if the bladder, rectum, or a small blood-vessel be punctured, except from infection of the cyst contents, if it be not already septic. A few drops of fluid are drawn for inspection.

*An Aspirator* may be used in the same way as the exploratory needle, the chief difference being that more fluid, or even all of it, can be withdrawn.

## THE TECHNIQUE OF GYNECOLOGICAL OPERATIONS.

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TECHNIQUE, in gynecology, is a word used to designate certain features in the details of an operation essential to its proper performance, and is the most powerful factor in ensuring its success. It has nothing to do with the diagnosis, the prognosis, or the determination to operate, but, having determined to operate, it concerns itself with every act, from the preliminary preparations to the completion of the operation. To assert, therefore, that the technique in a given operation is faultless, is to credit the surgeon with the highest scientific knowledge of his specialty, and the skill to properly utilize it for the benefit of his patient.

Imperfect technique implies errors of omission or commission on the part of the operator which may prove detrimental to the recovery of the patient or even cost her her life. With a perfected technique, therefore, the surgeon is acquitted of personal responsibility as to the result, providing his judgment in electing to operate has been good; while if his technique is bad he always stands arraigned before the bar of criticism, and is directly responsible for the bad results of his work.

The technique of an operation is thus made to include all those features which scientific investigation and consensus of opinion have shown to be conducive to success in the greatest number of cases.

It has nothing to do with dexterity, rapidity, or any other personal element in the operation, but is the basis or pervading principle of the work.

As it is the animating principle of successful operations, it is in the highest degree important to devote a separate chapter in a practical work on gynecology to the consideration of such technical details as are more or less common to operations in general, or to certain classes of operations. The variations in the technique of each individual operation must be left to the systematic description of the operation in its appropriate chapter.

The evolution of gynecology to its present high position as a specialty is due undoubtedly to the improvements in the operative technique.

In the earliest times there was no technique: the operator treated each case according to his own inclinations. Gradually, as the results of observations accumulated, individual operations crystallized in definite forms, and the technique of the operation was thus established. Further experience demonstrated the existence of certain underlying principles common to groups of operations, and culminated in one grand principle, antiseptic technique. This principle has proved the quickening element in the whole field of modern gynecology, giving life to old operations, calling new operations into existence, and yearly saving thousands of lives.

#### SEPSIS, ASEPSIS, ANTISEPSIS.

A proper realization of the significance of these three terms to practical gynecology constitutes the very essence of successful work. The cause of death after operation, in the vast majority of cases, is sepsis or germ-infection.

There is no longer any discussion among intelligent men as to whether certain forms of germs are dangerous and destructive to life, but the question is: Under what circumstances do these germs invade the tissues, and what are the best methods for excluding them?

*Sepsis* is the condition of infection resulting from the presence of one or more pyogenic organisms, such as the staphylococcus pyogenes aureus, staphylococcus pyogenes albus, streptococcus pyogenes, bacillus coli communis, gonococcus of Neisser, and also other rarer pyogenic forms.

Any of these organisms may be found pre-existing in the genital tract; the first and third are found oftenest in tubal abscesses. The second is found chiefly in stitch-hole abscesses. The colon bacillus exists in the intestinal tract, and may occasion a general peritonitis after an operation if the intestine is seriously wounded. Streptococci are for the most part found in the purulent inflammatory conditions following abortion or puerperal fever.

These are peculiarly virulent, and a little of the pus remaining in the pelvis is often sufficient to cause the death of the patient by a rapidly developing peritonitis.

The most harmless pus is that containing gonococci, as it is probable that these organisms die early. Pyogenic organisms are intro-

duced into wounds by the fingers of the operator, or on instruments, sponges, ligatures, or other objects not properly sterilized.

*Asepsis* means freedom from pyogenic organisms, and is the ideal condition for the hands of operator and assistants and for the instruments, sponges, ligatures, etc.

The surfaces of all objects exposed to the air are covered with bacteria; the hands not only become contaminated, but pyogenic bacteria may multiply beneath the finger-nails, and the most virulent germs may be transported from case to case. Relative to the operation, therefore, all objects not specially prepared and cleansed are germ-infected or septic.

*Antisepsis* is the application of any efficient means for getting rid of germs. It may be *mechanical*, as by scrubbing or washing; *chemical*, as by the use of carbolic acid or bichloride of mercury; or *thermic*, by boiling water or steam.

Mechanical antiseptic measures are of the utmost value in removing *from the hands* those germs which can be easily dislodged, though by this means alone the hands cannot be rendered perfectly sterile.

*Chemical sterilization* by drugs is becoming of less and less importance. A prolonged immersion of the hands in bichloride-of-mercury solutions as strong as 1 : 500 does not render them so sterile as the permanganate of potash and oxalic acid, yet it answers the purpose and is used by a large number of operators. Carbolic acid cannot be used for this purpose in efficient strength without injury.

*Sterilization by Steam and Boiling Water* has with complete satisfaction replaced all other measures in the sterilization of instruments, dressings, and ligatures.

An exposure to steam heat at 100° C. or 212° F. for a half hour will destroy all germs in cotton, gauze, bandages, or other dressings. If repeated on two successive days, the spores are destroyed, and objects so treated will remain sterile until exposed to contamination. A boiling 1 per cent. solution of the carbonate of soda will sterilize instruments in five minutes without tarnishing them or dulling the edge.

#### TECHNIQUE IN GENERAL.

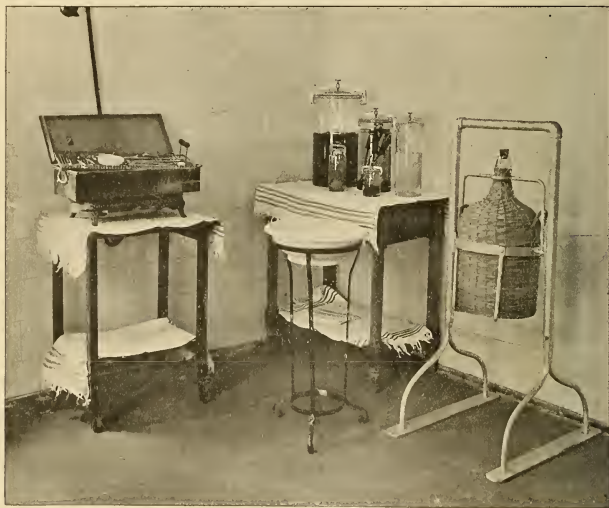
1, *Operating-room*; 2, *Surgeon, assistants, nurses*; 3, *Instruments*; 4, *Ligature and suture materials*; 5, *Dressings and sponges*; 6, *Towels, sheets, blankets, operating suits*; 7, *Drainage*.

## OPERATING-ROOM.

The requisites for a gynecological operating-room are—a floor on which water can be used freely, a good illumination, and an abundant supply of hot and cold water. A closely-joined wooden floor, if well paraffined, is satisfactory. The best floor, however, is made of encaustic tile, closely laid, as it does not absorb moisture.

The light in the operating-room should come from windows with a northern exposure and from a large skylight. Too strong light or direct rays from the sun embarrass the operator and spectators, blinding the eyes, and throwing the parts below the surface into deep shadow.

FIG. 19.

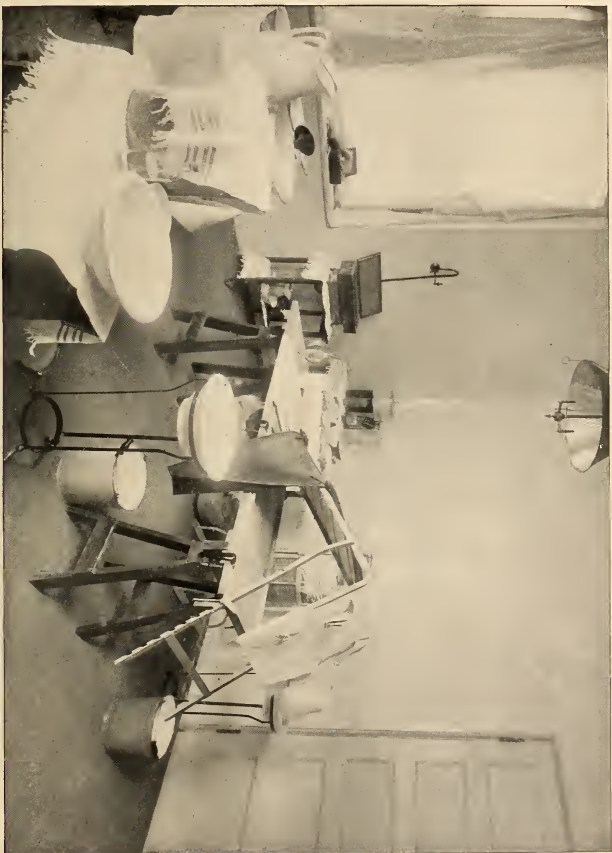


Sterilizer, Demijohn, Basin-holder, Sponges, Drainage-tubes, Syringes, Sutures, etc.

There should be an abundant supply of hot and cold water. The hot or cold water circulating in the pipes will do for the purpose of preliminary cleansing and for washing the hands, but should in no way come in contact with the field of operation unless previously sterilized by boiling.

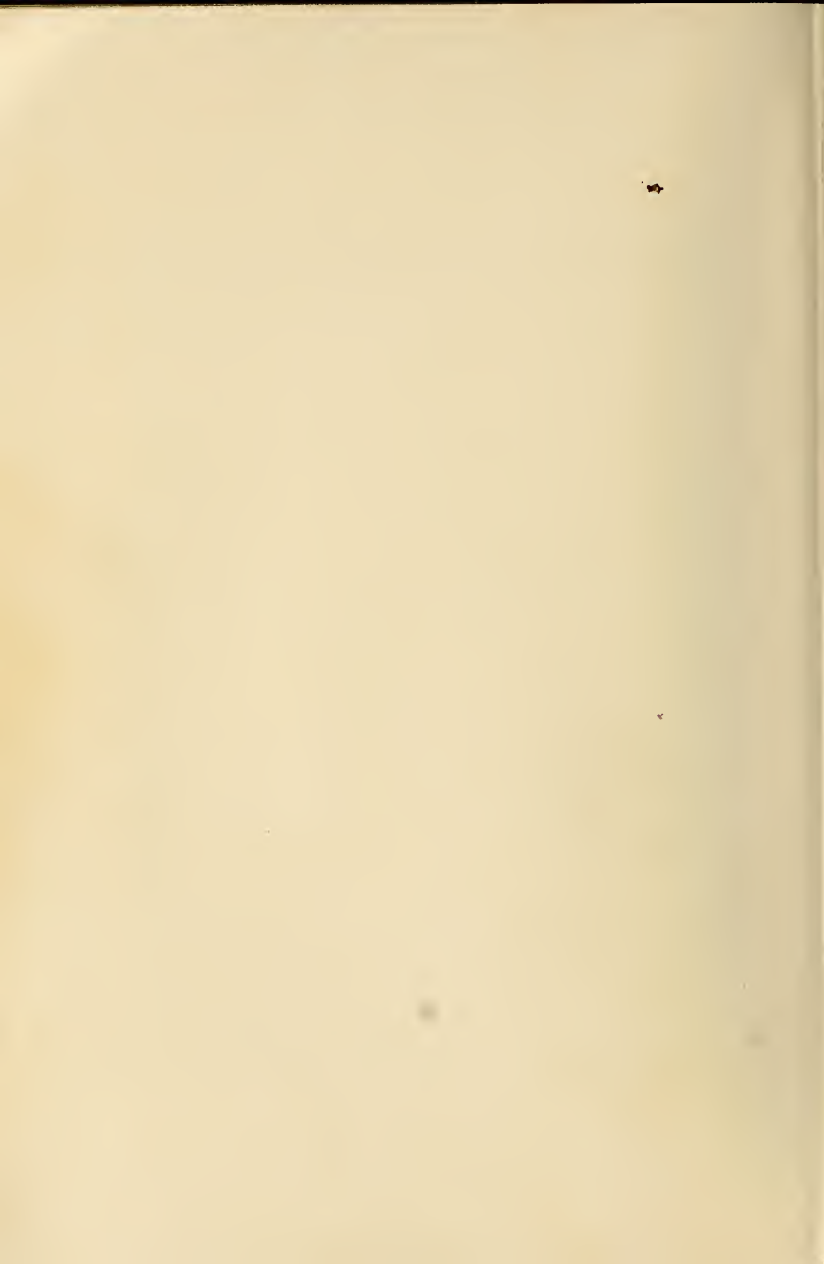
In the operating-room there must be several wash-basins supplied with hot and cold water; also a large sink with an abundant

PLATE IX.



Operating-room of the gynecenean Hospital prepared for an operation.







water-supply, and drip-stones near by for dishes. There must also be an apparatus for steam disinfection, and vessels for the boiling soda solution and for boiling water.

In another part of the room the ligatures, gauze drains, sponges, and the sterilized gauze and cotton are stored in glass jars.

The instrument-case is provided with glass shelves, as they are easily kept clean and expose all the instruments to view. The instruments are kept properly classified in groups—scissors, knives, forceps, etc.

Adjoining the operating-room is a small room for the administration of anesthesia. The patient is brought here from the ward and anesthetized without witnessing any of the preparations which have been made for her reception in the operating-room.

After each operation the floor is cleansed by mopping with water. Occasionally the walls should be gone over with a damp cloth. A good enamel paint will resist the discoloring effects of the moist atmosphere of the room.

Some operating-rooms are conveniently arranged with subsidiary rooms in which all the preparations for an operation are made, leaving the room for the operation perfectly clear for operator, assistants, and spectators. This is a more convenient arrangement when the operations are frequently performed in the presence of large classes. These same principles may be carried out in a private residence as efficiently, if not so elaborately, as in the hospital.

The accompanying cut of one of the operating-rooms of the Gyncecan Hospital, Philadelphia, prepared for an operation, shows at a glance how easily and simply the indications can be met. It will be seen that there are but few articles in the room which cannot be obtained or substituted in any well-regulated private residence. A plain kitchen table may be made to answer the purpose of the operating-table. If it is desirable to use the Trendelenberg position, a Krug frame can readily be taken to the house in the physician's carriage. Instruments may be boiled in any conveniently-sized tin basin. Five- or ten-gallon demijohns of distilled water may be usually obtained, but if not, boiled water will answer all purposes. If it be muddy, it should of course be filtered before boiling.

## THE OPERATOR AND HIS DIRECT ASSISTANTS.

The responsibility of the operator and his assistants does not begin, as it is commonly believed, in the preparation immediately before the operation. It is a duty, always devolving upon all persons who come in direct contact with wounds of any sort, to avoid at all times unnecessary contact with septic matter. Unhealthy or suppurating wounds should never be touched with the fingers when it is possible to avoid it; dressings of such wounds should be removed and replaced by forceps.

The gynecologist has no right to conduct post-mortem examinations or handle pathological specimens. When contact with possibly infected objects is necessary, the lodgement of infection in the skin and under the nails should be prevented as far as possible by coating the surface of the fingers and hand with vaseline, and making the contact as brief as possible; and this should be followed immediately by a thorough scrubbing of the hands.

The surgeon and his assistants, like obstetricians, should avoid the habit of wearing gloves which cannot be washed. Contamination is often conveyed by examining a septic case, hurriedly washing the hands, and drawing on gloves which become thus contaminated, and which in turn reinfect the hands each time they are worn.

Both surgeons and assistants should bathe frequently and wear clean apparel. It adds to the comfort, as well as harmonizes with the sense of cleanliness, if the surgeon can step from his bath into his operating suit. Operating suits for surgeon and assistants should be made of stout butcher's linen. The jacket should be open in the back; the pantaloons may be separate or attached to the jacket. Tapes should be used in place of buckles for the pantaloons. The sleeves should be short, reaching to within two or three inches of the elbow. Before putting on the suit the outer clothing should be removed down to the under-clothes. It is in better keeping with the appearance of the rest of the costume to wear also white linen caps and white canvas shoes with rubber soles. The nurses must wear wash dresses with fresh white front and *short sleeves*.

For operations in private houses aprons of stout butcher's linen sufficiently long to cover the clothing from the neck to the ankles will give the proper amount of protection.

*Cleansing the Hands and Forearms.*—The first duty after enter-

ing the operating-room is to cleanse the hands and forearms thoroughly at the basin with a stiff scrubbing-brush, soap, and warm water, frequently changing the water. At least ten minutes must be spent in scrubbing the hands and forearms, paying especial attention to the finger-nails.

After washing the hands and forearms they are immersed in a hot saturated solution of permanganate of potash until they are stained a deep mahogany-red, when they are decolorized in a hot saturated solution of oxalic acid. The hands are then washed off in milk of lime or in plain water to remove the oxalic acid. The nurses who handle sponges, gauze, prepare ligatures, etc. must also wash and sterilize their hands in the same way.

A common and excellent substitute for this method of sterilization is to bathe the hands and arms in alcohol after scrubbing them with the nail-brush and soap. They are then soaked in a strong bichloride-of-mercury solution (1:500) for five minutes, and the bichloride is finally washed off with sterilized water.

After such preliminary sterilization the operator must avoid contact with non-sterilized objects, such as lids of jars and vessels, door-handles, tables, any part of his own person, such as the hair or eye-glasses, or the patient; above all must such inconsistencies as shaking hands with visitors, putting the hands in the pockets while waiting, etc. be avoided.

When it is necessary to come in contact with the patient, as in placing her on the pad or in removing the bandages, the hands must again be cleansed by washing for two minutes. During the course of the operation the operator and assistant should frequently rinse off their hands in a basin of warm sterilized water which is kept standing in a convenient position for that purpose.

#### INSTRUMENTS.

After each operation the instruments are immersed in hot water and scrubbed with soap and a scrubbing-brush. They are then rinsed in hot water and placed upon a clean dry towel, and rapidly dried, the heat from the water assisting in this process. After drying the instruments they are classified in separate groups on the shelves in the instrument-case. Before the next operation they are collected in a linen bag and placed in the sterilizer. If the operation has been a septic one, they are sterilized before putting them away, and again just before the succeeding operation.

The sterilization of instruments is simply and efficiently effected by boiling them in a solution of carbonate of soda, of 1 per cent. strength, for ten minutes. The bag is then picked up by the draw-string, which has been left hanging out over the edge of the vessel, and carried to the instrument dishes, which have been arranged on a table convenient to the operator or assistant who is to handle them, into one of which it is emptied. If a wire or perforated tray be used upon which they are boiled, the tray may be lifted from the

FIG. 20.



Placing Instruments in Arnold's Sterilizer, in Linen Bag.

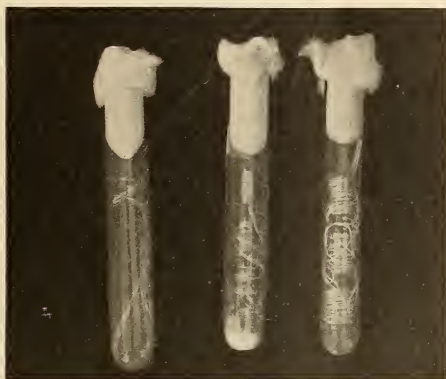
sterilizer, placed on the instrument-table, and the instruments used directly from it. Cold sterile water is poured over the instruments, and when cooled they are appropriately classified. The instruments should be kept bright and free from tarnish by the occasional use of a fine soap, such as sapollo, used for polishing metallic surfaces.

#### LIGATURES AND SUTURE MATERIALS.

The ligature and suture materials used in gynecology are silk, catgut, silkworm-gut, and silver wire.

Tendon sutures, while excellent, are too expensive to come into general use. The silk should be of the twisted Chinese variety of three grades—fine silk, used as carrier threaded in the needle, by means of which the sutures are pulled through the tissues; intermediate silk, for all ordinary purposes of suture and ligature, even for ligating the ovarian and uterine arteries and approximating the edges of the stump in hysterectomy for myoma; and heavy silk, for ligation in vaginal hysterectomy.

FIG. 21.



Silk in Tubes for Sterilization.

The *silk* is sterilized by placing it in stout glass tubes made for this purpose, or in pieces of stout glass tubing an inch in diameter, plugged at both ends with cotton. The silk should be cut in convenient lengths and rolled loosely on glass reels which fit the inside of the tube. The tube is then placed in the sterilizer, steamed for an hour, taken out, and the process repeated a half hour on two succeeding days. The cotton is left in place until the sutures are used. The ligatures are sterilized by this fractional method of sterilization with absolute certainty, as this is the method employed in the bacteriological laboratory for sterilizing culture media. The steam penetrates the cotton and circulates with perfect freedom in the tube.

Where steam is constantly circulating through the establishment, it may conveniently be utilized for sterilization by tapping the pipe into a copper cylinder. A coil of pipe filling the inside of the cylin-



der, also connected with the steam system, serves to keep up a high temperature and to dry out the dressings when the free steam is turned off.

Of the steam sterilizers, that of Arnold is the best for transportation to private houses and for clinics not fitted with special conveniences.

*Silkworm-gut* is sterilized in the same manner as the silk. It should be assorted into light and heavy sizes.

*Catgut*.—Catgut is ruined by water or steam, and requires, therefore, a different mode of sterilization. The following method is that of Krönig, modified in some particulars:

1. Cut the catgut into the desired lengths, and roll twelve strands so that they may be slipped into a large test-tube.

2. Bring the catgut gradually up to a temperature of 80° C., and hold it at this point one hour.

3. Place the catgut in cumol, which must not be above a temperature of 100° C., raise it to 165° C., and hold it at this point for one hour.

4. Pour off the cumol, and either allow the heat of the sand-bath to dry the catgut or transfer it to a hot-air oven at a temperature of 100° C. for two hours.

5. Transfer the catgut with sterile forceps to test-tubes previously sterilized, as in the laboratory.

If convenient, it is better to use the hot-air oven for the drying process, but this is not absolutely essential, as a sand-bath can be improvised to serve this purpose.

A beaker-glass of at least a half-litre capacity is imbedded three-fourths of its height in a tin or agate-ware vessel of sufficient capacity to permit three-fourths of an inch of sand to be packed about the sides and beneath the glass.

In drying or boiling the catgut should not come in contact with the bottom or sides of the vessel, but should be suspended on slender wire supports or placed upon cotton loosely packed in the bottom.

During the drying process the beaker-glass is covered with a sheet of pasteboard, through which a centigrade thermometer is thrust, so that the mercury bulb may be suspended about midway in the vessel. In this way the temperature can be regulated perfectly.

A Bunsen burner is placed under the sand-bath, and the temperature in the beaker-glass is slowly brought up to 80° C., where

it is held for one hour, to dry the catgut. A higher temperature than 100° C. before the catgut is thoroughly dry renders it brittle; this step in the method must be carried out most carefully.

When the drying process is completed the cumol is poured into the beaker-glass and brought up to a temperature of 165° C., a little short of the boiling-point, with two Bunsen burners. A copper wire netting should be placed over the beaker-glass to prevent the ignition of the cumol. This temperature is more than sufficient to kill all micro-organisms, and it is not necessary to allow the cumol to boil, which causes unnecessary evaporation. The catgut is left for one hour at this temperature, when the cumol is poured off for subsequent use.

Cumol, which is of a clear limpid or slightly yellowish appearance when procured from the chemist, is changed to a brownish color by boiling.

The catgut is allowed to remain in the sand-bath until the excess of cumol is driven off and it appears entirely free from any oily matter. A period of one to two hours is usually sufficient to dry it thoroughly.

From the sand-bath or hot-air oven it is transferred with sterile forceps to sterile test-tubes, such as are used for culture media, in which it is preserved from contamination until ready for use. Small quantities should be placed in each tube to obviate the necessity of opening them too frequently. The tubes should be plugged with sterilized cotton.

In conclusion, it is well to bear in mind that while cumol is not explosive it is very inflammable, and great care should be observed in lifting the wire screen from the beaker-glass to prevent drops of the cumol from falling in the flame or on the heated piece of metal on which the sand-bath rests, as it will take fire, flare up, and ignite the fluid in the beaker-glass. Such an accident has occurred three times in our experience.

Another equally efficient method of preparing catgut is as follows:

(1) Soak the raw catgut for one week in oil of juniper, (2) forty-eight hours in ether; (3) forty-eight hours in plain alcohol, and finally boil for two hours in an alcohol bath. Keep in alcohol until wanted.

Each portion of catgut taken from the stock-jar for an operation is to be boiled for twenty minutes in alcohol before being used.



Only a small portion of gut should be prepared at one time, as too frequent boiling renders it brittle and liable to break.

#### DRESSINGS AND SPONGES.

*Sponges* are prepared by pounding them in a wooden bowl to loosen the grit, and then washing them in warm water until the water remains clear. It may be necessary to change the water eight or ten times. From the water they are transferred to dilute hydrochloric acid (3ij to Oj) and allowed to stand for twenty-four hours. This part of the process is necessary to remove all chalky particles. From the hydrochloric acid they are passed quickly through permanganate-of-potash solution (5 per cent.), which stains them a dark purple; the sponges are then decolorized by immersing in a saturated solution of oxalic acid. Before transferring the sponges to the oxalic-acid solution the hands should be disinfected after the same method as for operation, as the permanganate of potash and oxalic acid are the essential factors in the process of sterilization, and the sponges must not be contaminated from this stage on. From the oxalic-acid solution, where they have remained only a sufficient time to effect decolorization, they are transferred to sterilized lime-water, which neutralizes the acid, and then into bichloride-of-mercury solution (1 : 1000) for twelve hours, after which they are rinsed twice in sterilized water and preserved in carbolic-acid solution (3 per cent.) until they are desired for use.

After being washed free from the hydrochloric acid another good method for cleansing is to immerse the sponges in a saturated solution of washing soda for forty-eight hours, from which they are taken, thoroughly washed free from the soda, and immersed in a bichloride-of-mercury solution (1 : 1000) for twelve hours, after which they are placed in alcohol, where they are kept until used. After being soiled at one operation they may be prepared for further use by the same method: prior to placing them in the mercurial solution, however, they are immersed in a strong sulphurous-acid solution for twelve hours for the purpose of decolorization.

When gauze is used for sponges it should be thoroughly sterilized in steam by the method used for sterilizing the dressings.

Gynecological dressings consist of sterilized absorbent cotton and iodoformized gauze and abdominal and T-bandages.

*Absorbent cotton* is unrolled from the bales in which it is bought and cut into pieces of various sizes or made into loose balls. The

large pieces are laid in a towel, which is pinned together so as to completely protect the cotton. They are then thoroughly sterilized for several hours in the steam sterilizer. The balls are sterilized for several hours in a glass jar, which is left open during the process; at the end of this time the free steam is cut off and that circulating through the coil allowed to dry them out thoroughly.

*Gauze.*—Gauze is bought in rolls of one hundred yards each, at a little over three cents a yard. It is cut into strips of several yards' length, and then sterilized in the same manner as the cotton and other dressings. Both gauze and cotton are used preferably by many operators after they have been impregnated with bichloride of mercury. Such material should never be used inside the peritoneal cavity. It may be bought already prepared in the shops, but should be resterilized by steam for several hours before using.

*Iodoformized gauze* is prepared by impregnating rolls of sterilized gauze with an emulsion of iodoform in soapsuds and water. This should also be subsequently sterilized for several hours in steam.

#### TOWELS; SHEETS; BLANKETS; OPERATING SUITS.

All towels, sheets, blankets, bed-clothes, or any similar articles used about the patient or brought into the operating-room, as well as the doctors' and nurses' aprons and operating suits, after being securely wrapped in towels should be subject to several hours' sterilization in the steam sterilizer. All glass-ware, iron, wooden, or rubber utensils used in or about the operation must be sterilized by being scrubbed with soap and water, doused with boiling water, and finally mopped with a strong bichloride-of-mercury solution (1 : 200).

#### DRAINAGE.

*Roll Gauze and Mikulicz Drains* are rarely useful. These drains are difficult to remove, and cause the patient much distress, as they cling closely to the skin and the underlying tissues. They not infrequently defeat the object for which they are used by damming back and allowing an accumulation of the fluids to be drained. The roll-gauze drain is made by forming a piece of gauze a yard long into a loose roll about three-quarters to one inch in diameter. Pieces of the length desired can be cut off. The Mikulicz drain is made of a gauze bag one or two inches in diameter and about eight inches long, with a string tied to its bottom, the end of which string

protrudes from the mouth of the bag. This bag is loosely filled with three or four long strips of gauze, about two and a half inches wide, which project from the top of the bag. A good substitute for this drain is to fill loosely a soft-rubber tube (an ordinary rubber condom with the closed end cut off), open at both ends, with a strip of roll-gauze drain.

All these drains are carried to the point which it is desirable to drain, and the opposite end is left protruding from the lower end of the wound. The drainage is effected by capillary attraction, which carries the discharge to the surface, where there must be an abundance of sterilized cotton to take it up. It is necessary to change the dressings frequently the first day or two. The drains are removed in several days, and a small rubber tube substituted temporarily until the drainage tract has contracted. It may be preferable to pass a single strip of gauze to the bottom of the drainage tract instead. This is ordinarily removed permanently within another day. Circumstances may, however, demand its retention several days longer. At times it becomes necessary to pack the pelvis or a portion of it with gauze for the purpose of checking oozing, which cannot be controlled otherwise on account of the difficulties of so doing or because it is dangerous to prolong the operation. This is best accomplished with long strips of gauze several inches wide and several yards long. But one strip should be used if possible. Great care must be observed to pack the gauze in concentric layers, else it will be found exceedingly difficult to remove. This pack holds the bleeding in check by direct pressure, and at the same time, to an extent, serves the purpose of a capillary drain. The end is left hanging out of the lower opening of the abdominal incision, and requires the same care as do all gauze drains. It should be removed within two days, and better still at the end of one day, by pulling on the protruding end.

In all gauze drains it will be found necessary to free with a probe that portion of the gauze passing through the abdominal wall and adherent to its tissues. Not infrequently after withdrawing the gauze a knuckle of the intestine or omentum will be found to have been drawn into the incision. This must be carefully replaced by means of a sterilized probe, the parts cleansed, and the gaping incision brought together by means of a piece of sterilized gauze and a strip of adhesive plaster.

*Glass drainage* is used more frequently than gauze, but in care-

less hands it is exceedingly dangerous, and should be avoided, as should all drainage, except when absolutely necessary. Drainage of any kind is rapidly becoming a thing of the past in abdominal surgery.

The drainage-tube should be about six inches in length and of a calibre just sufficient to admit the nozzle of the syringe used in cleansing it. It should be sterilized by being boiled with the instruments in soda solution. The object of the tube is to keep the cavity to be drained perfectly dry. To accomplish this it is necessary, at times, directly after the operation, to cleanse the tube every fifteen minutes. In the course of a few hours the intervals of cleans-

FIG. 22.



Glass Drainage-tube.

FIG. 23.



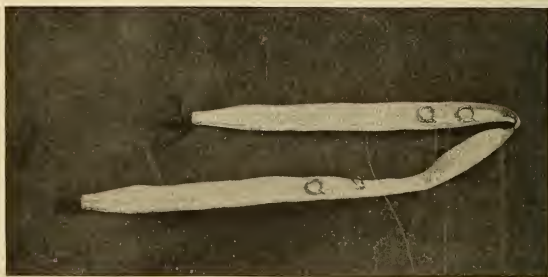
Hard-rubber Syringe, for cleansing drainage-tube.

ing are lengthened, until it is not repeated oftener than three or four times a day. The tube is removed as soon as the discharge assumes the straw color of the normal peritoneal fluid and the amount is diminished to a few drachms at each cleansing. The tube is kept dry, while *in situ*, by passing a long-nozzled syringe to its bottom and removing the accumulated fluids by suction. Before and after each cleansing the mouth of the tube and the rubber-dam through which it projects must be washed carefully with a piece of cotton dipped in bichloride-of-mercury solution; the syringe should be disinfected both inside and out with bichloride solution and boiling water. The hands of the person cleansing the tube must be carefully disinfected before each dressing, no matter how often repeated. In no other way can the safety of the patient be ensured. Fresh sterilized cotton is placed over the mouth of the tube each time it is disturbed, and is held in place by a square piece of rubber-dam, through the centre of which the free end of the tube protrudes.

## THE TECHNIQUE OF VAGINAL OPERATIONS (NOT OPENING THE PERITONEAL CAVITY).

Preceding a plastic operation upon the vagina or external genitals the bowels should be thoroughly evacuated by two or three free purgations, started with a laxative, such as a pill composed of aloes gr. j, belladonna gr.  $\frac{1}{6}$ , and strychnia gr.  $\frac{1}{30}$ , taken thirty-six hours before the time of operation, followed, if necessary, by citrate of magnesia. A Seidlitz powder or several large (3j) doses of magnesium salts twenty-four hours before operation, followed by a rectal enema the next morning, is also efficient. A vaginal douche of bichloride of mercury (1:3000) should be administered daily for some days prior to operation where possible. The day before the operation the diet should be light, with no breakfast the following morning.

FIG. 24.



Robb's Modification of Kelly's Leg-holder.

In perineal, vaginal, and rectal operations the patient is brought down to the edge of the table, with the thighs well flexed on the abdomen and held in this position by a leg-holder. The simplest form of leg-holder is that devised by Robb. One of the ends is placed around the leg just above the knee, and is then hooked into one of the rings on the shoulder-strap. The other end is drawn under the arm, around the back of the neck, down over the opposite shoulder, and hooked about the opposite leg above the knee. Like everything else used about an operation, it should be sterilized. This is readily done by means of the steam sterilizer.

The leg-holder may be dispensed with, and an assistant's hands substituted.



The perineal pad is next inflated and placed under the buttocks, with the apron dropping into a bucket at the foot of the table.

In vaginal operations the preparatory cleansing is conducted as follows: The external genitals are thoroughly soaped, and this worked up into suds with warm water; the hair is next shaved off the vulva, although this procedure is by no means absolutely necessary, provided the operator takes sufficient care to render the

FIG. 25.



Assistant Supporting Legs.

hairs aseptic. The vagina is thoroughly cleansed with soap and warm water. A 10 per cent. solution of creoline makes an excellent detergent if applied vigorously by means of a ball of absorbent cotton in the grasp of a pair of forceps, so as repeatedly to stretch out and cleanse every little fold and rugosity. The parts around the field of operation are protected in the following manner: A dia-



phragm composed of three or four thicknesses of gauze is laid over the vulva, inner surfaces of the thighs, and buttocks, reaching well down below the border of the table. Through a slit in the centre of this the operation is performed. The legs of the patient are covered with loose sterilized stockings reaching above the knees, where they are tied with draw-strings.

The irrigator is of great service in perineal work. By its use sponges are dispensed with, and the blood which is at once diluted fails to clot, and does not cling to the fingers.

The best form of irrigator is a large glass jar placed on a shelf three feet above the head of the operator. An opening near the bottom provides for the escape of the water, which is conducted through a rubber tube and ends in a glass nozzle with an intervening stopcock.

#### THE TECHNIQUE OF ABDOMINAL OPERATIONS.

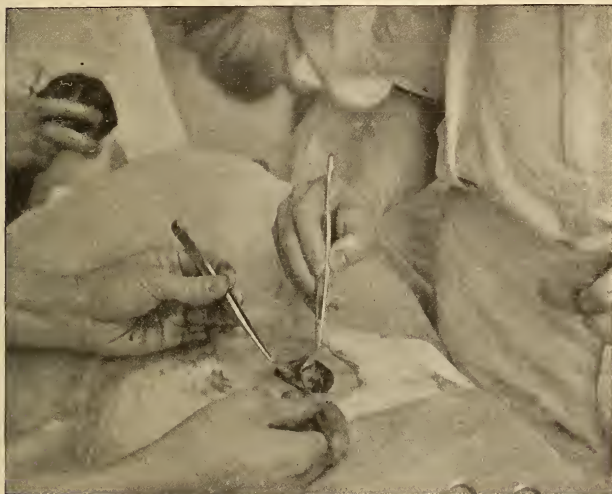
The technique of abdominal operations begins with the preparatory treatment of the patient immediately before operation, and includes all the details in the preparations for and the carrying out of the operation. Certain features are common to all abdominal operations. Of these but two will be described: the opening and closing of the abdomen.

*Preparatory Treatment.*—It is necessary to begin in some cases weeks beforehand if the patient be in an enfeebled condition and there is any prospect of building her up for the operation. The most important elements of the treatment are rest in bed, digestible food at frequent intervals, stimulants and tonics if well borne, regulation of the bowels, and quickening the activity of the skin by baths, massage, and electricity. Strychnia in doses of  $\frac{1}{30}$  of a grain three times daily is indicated in all such patients. In other cases, where the general condition is good, a delay of but one or two days is necessary in which to bathe the patient and thoroughly evacuate the bowels. Almost all chronic cases, not excluding pelvic abscesses, will be benefited by preparatory treatment.

Such cases as extra-uterine pregnancy with internal hemorrhage, rupture or strangulation of a cyst, acute septic conditions, or rupture of an abscess call for immediate operation. Here all the advantages of rest and preparation are subordinate to the paramount danger which threatens to destroy life. Occasionally it will be necessary to give the patient an anæsthetic, and without preliminary prepara-

tion lift her on to the ovariectomy pad upon the table, where the vagina is douched out with a strong boric-acid solution, or a 10 per cent. creoline solution, or a 1:1000 solution of bichloride of mercury. The mons veneris is shaved well down to the labia, the abdominal walls cleansed, and celiotomy performed at once.

FIG. 26.



Opening the Peritoneum

Ordinarily the patient has a warm bath and a vaginal douche of bichloride of mercury (1:2000) daily for several days. The morning before her operation purgatives are administered: magnesia salts in some form in half-ounce doses are taken hourly until the bowels begin to move, which will generally be after the administration of four or five doses. A full dinner is allowed, but only a light supper; no breakfast is taken the next morning. In the morning an enema of soap and warm water is given, and the vagina is prepared by being washed thoroughly with soap and hot water, followed by alcohol and a bichloride-of-mercury solution (1:1000), and finally packed with sterilized gauze, after which the patient is put in a hot soap-bath, where she is well scrubbed with a flesh-brush, special attention being given to the abdomen and buttocks.

On coming from the bath she is given a fresh sterilized night-gown and goes to her bed, which in the mean time has been made up with fresh sterilized bed-clothing. The abdomen is to be thoroughly prepared in the bed by first scrubbing with soap and hot water with the aid of a nail-brush, followed by alcohol and ether, and this by a strong bichloride-of-mercury solution (1:1000). The abdomen is covered with a pad of sterilized gauze, to prevent contamination of the skin in transporting her to the operating-room. While the anesthetic is being administered a nurse whose hands have been thoroughly cleansed empties the bladder with a sterilized catheter, after which the vulva is mopped off with a bichloride-of-mercury solution.

The patient is placed on the table with her hips resting on Kelly's ovariectomy pad, the apron of which hangs over the side of the table into a bucket. The assistant, after removing the sterilized gauze pad, now finally cleanses the abdomen by first scrubbing it with a ball of cotton and ether, and then with pure alcohol.

Sterilized towels are used to protect the thighs and chest, and over the abdomen, chest, and thighs a large piece of sterilized gauze, three folds thick, is laid. This is split open for a short distance in the median line, and through this opening the operation is conducted with a minimum danger of infection from the patient's skin.

*Opening the Abdomen.*—The usual location for the incision is in the median line between the umbilicus and pubes, nearer the pubes.

For making the incision a sharp scalpel, two pairs of rat-tooth forceps, and one or two short sharp-nosed artery forceps are necessary.

The operator steadies the abdominal wall and holds the skin a little taut, between the thumb and middle finger of the left hand, while the right hand makes a sweeping incision vertically downward in the median line from two to eight inches long, according to the nature of the operation. In doubtful cases a shorter incision should be made first, and afterward lengthened if necessary.

After passing through skin and fat the sheath of one of the recti muscles appears. This white and fibrous layer may be cut a little obliquely, when the incision is almost sure to cross the linea alba, seen between the two red muscles. The incision is continued down between the muscles in the linea with the aid of an assistant, who catches the tissue of one side with his forceps, while the operator does likewise on the opposite side. Thus the tissues are lifted up and drawn apart, layer by layer. The superficial fat, which is of variable

thickness, appears next, and beneath this the thin, delicate peritoneum. The peritoneum must be caught very superficially in the forceps and gently incised, so as merely to nick it. The intestines drop back the moment the smallest opening in the peritoneum is made, and then the incision can boldly be enlarged upward and downward to both extremities of the incision. In enlarging the incision the operator should always glance through the peritoneum which is lifted

FIG. 27.



Method of Enlarging the Abdominal Incision.

up by forceps, to assure himself that he is not opening an abnormally high bladder.

The bleeding from the walls of the incision, although stimulated by the massage given in scrubbing the skin just previous to the operation, is usually slight, and ceases spontaneously, as a rule. If too free, one or more vessels may be caught with artery forceps, which can be removed at a later stage of the operation, when the bleeding will have ceased. Occasionally a large spouting artery requires immediate ligation with the finest silk or catgut ligature. If the incision proves too small, it may quickly be enlarged by cutting upward with a pair of scissors rounded on the points, guided by a finger within the abdomen, which protects the viscera from injury.

*Closure of the Abdominal Incision.*—The incision should be

closed by two or three rows of sutures; one continuous suture of fine catgut uniting the peritoneum, transfixing each side three or four times to the inch. Immediately overlying the peritoneum are the recti muscles, and over these, often a little retracted from the margins of the wound, are the cut edges of the strong fibrous fascia. These are approximated by a layer of interrupted, buried silver-wire sutures, about one or two to the inch, taking great care to bring together the edges of the fasciæ of the two sides from top to bottom of the wound. This is the most important step in the closure, as in this fascia lies the strength of the abdominal wall, and in its proper reunion lies the protection against a ventral hernia which may arise as a sequel to the operation. The interrupted sutures should be drawn sufficiently tight to hold the parts snugly together, but never tight enough to constrict the tissues. The ends are twisted together, and then turned downward to prevent any irritation. The approximation of the skin may be secured either by an interrupted silkworm-gut or a continuous fine catgut suture, entered below the lower angle of the wound, passing from side to side subcutaneously, and reappearing above the upper angle.

A simpler and more satisfactory method of closure is to place a series of interrupted silkworm-gut sutures about one-third of an inch apart, each including all the tissues of the abdominal wall (skin, peritoneum, and all intervening tissues). Before tying these sutures the edges of the divided deep fascia are brought together by means of a continuous catgut suture, the ends of which are cut short. The through-and-through silkworm-gut sutures are then securely tied.

*Dressing the Wound.*—The skin is first carefully dried with sterile gauze or with a sterile sponge, and three sheets of sterilized silver-foil are laid over the wound, covering it entirely. Over this are placed several layers of sterilized gauze held in place by adhesive straps; sterile absorbent cotton is laid over all, and the sterilized six-tailed bandage holds this in place.

Another simple and effective method of dressing is, first, to place half a dozen layers of sterilized gauze over the incision, completely covering it, then a pad of absorbent cotton covered with sterilized gauze large enough to cover the abdomen, and the whole held in place by means of a six-tailed bandage. In all emaciated women all inequalities in the abdominal wall are to be filled in with pads of sterilized cotton placed over and about the gauze dressing.



THE TECHNIQUE OF VAGINAL OPERATIONS (IN WHICH THE PERITONEAL CAVITY IS OPENED).

The bowels should be opened by a gentle calomel purge four days, if possible, before the operation, and thereafter are to be kept regular by compound rhubarb pills given at bed-time.

If the operation is to be in the forenoon, the rectum is emptied by an enema the previous night, and a liquid supper of toast and broth given. No food or drink is given in the morning.

If the operation is to be after one o'clock, the evening enema is given, and in the morning early coffee and toast are admissible.

*Preparation of the Field of Operation.*—A routine practice is to be adopted for all cases. The abdomen should be prepared as for an abdominal section. It is necessary to prepare the abdomen, as the operator may be at any time obliged to abandon the vaginal method and adopt the abdominal. The day before the operation the vagina is filled with a wet bichloride-of-mercury dressing. The pubes and vulva may be shaved either before or after the patient takes ether.

The operator cleanses the vagina after the patient is on the operating-table. The vagina, vulva, and buttocks should be cleansed with soap and hot water by means of a long brush, sterilized, such as jewellers use to clean watches. The vulva is further rendered sterile by means of ether, alcohol, and bichloride-of-mercury solution. All parts about the field of operation are then covered by sterilized towels. A diaphragm composed of three or four thicknesses of gauze laid over the vulva, inner surfaces of the thighs, buttocks, and pubis, reaching well down below the border of the table, covers all. Through a slit in the centre of this the operation is performed. The bladder is emptied by the operator by means of a sterilized catheter prior to the disinfection of the vagina. The operator then disinfects himself again.

GENERAL DETAILS FOR ALL OPERATIONS.

During the progress of all operations the sponges should be handled by one nurse alone, who has no other duty to perform. She should pass the sponges directly to the operator or assistant, and should take them again for cleansing directly from his hands. A sponge should never be laid down anywhere, excepting in its basin of water, by either nurse or surgeon or assistant. In no other way can one be sure they will not become contaminated.



Instruments should be placed in trays convenient to the operator or assistant, and should be handled by no one else. Like sponges, they should always be returned to their trays when not in immediate use.

Needles, ligatures, sutures, etc. should be handled exclusively by the nurse or assistant assigned to that duty, and, like everything else, should pass directly from his or her hands to those of the operator or assistant alone.

Every assistant or nurse should be assigned to an especial duty, and under no circumstances be allowed to depart from it; nor should any visitor in the operating room be allowed to at any time touch any person or article in the room under any circumstances. Clean linen "dusters" should be provided for visitors, in the pockets of which they should be requested to keep their hands.

Should it become necessary for a nurse to open a door, a window, pick up a bucket, or in any way risk contamination of her hands, she should first take up a sterilized towel and with it in her hand perform the duty: the towel should at once be thrown on the floor, so as not to be again used.

As in all operations of any kind whatsoever, all organs of the body should be given a thorough overhauling, else some lesion which may form a contraindication for anesthesia and operation may exist. More especially should the kidneys be carefully examined for the purpose of eliminating the presence of albumin or renal casts.

#### SALINE INFUSION.

In patients who have been profoundly septic for a long time or have nephritis, or because of hemorrhage either before, during, or after an operation, it may be found necessary to fill the vessels with saline solution. This acts beneficially in three ways: it washes into the general circulation the leukocytes which are in a state of stasis, thereby increasing the resistant power of every tissue; it supplies fluid which has been lost by inability to assimilate drink or by hemorrhage; and it so dilutes the blood that damaged kidneys can eliminate the deleterious salts which should be removed from the blood. There are two ways of administering the fluid—subcutaneously and intravenously.

The essentials to the operations are—an eight-ounce glass funnel, six feet of rubber-tubing attached to the funnel, and a large aspirating needle or small trocar. A 1 per cent. solution of ordi-

nary table salt is made and filtered through plain cotton or several thicknesses of closely woven muslin (unstarched). The salt solution is boiled in a perfectly clean kettle, and cooled to about 110° F. by setting the kettle in iced water. In testing the solution the degree of heat should be determined by passing a small portion of the solution over the naked arm. When once the solution is made, the kettle should be kept closed. The infusion apparatus should be boiled in plain water, not soda solution, for twelve minutes.

*Subcutaneous Infusion.*—The operator carefully sterilizes his hands. He then washes with 2 per cent. lysol or bichloride-of-mercury solution a small spot of skin over the margin of the latissimus dorsi muscles at the level of the nipples. A cone-shaped piece of ice is dipped into salt and pressed against the cleansed skin. When the skin freezes it is incised with a sharp scalpel. Filling the funnel with salt solution, the operator raises it, and allows the solution to flow through the cannula, and while the stream is running he inserts the cannula or needle just beneath the skin or under the breast. As the fluid flows, a large swelling forms. An assistant watches the pulse. Often to encourage the flow it is necessary to strip the tube with the fingers from above downward. The procedure can be repeated each twelve hours so long as deemed advisable. From eight ounces to a pint can be thus introduced into the subcutaneous tissues at each puncture-point.

*Intravenous Infusion.*—An assistant holds the bared arm of the patient and constricts the veins above the elbow by circling the arm with his hand. The hollow of the elbow is sterilized. The injection is made into the median basilic vein where it crosses the middle of the bend of the elbow. For a space of a half inch alongside, not over, the vein the skin is carefully incised. As soon as the operator passes entirely through the skin he comes to the loose subcutaneous tissue, which may be filled with fat lobules. Having passed through the skin, the cut is made to slide over the centre of the vein and the edges retracted. The operator grasps the distal portion of the exposed vein with artery forceps and lifts the vessel up. He separates the vessel from underlying tissues by blunt dissection, and grasps the wall of the vein with artery forceps above the first pair. He must hold the proximal part of the vein securely, yet must not obliterate the calibre. The vein is then cut entirely across. The mouth of the proximal end is grasped with mouse-toothed forceps and the assistant starts the flow of saline solution through the can-

nula. After all bubbles have escaped and the fluid flows at a proper temperature, the operator inserts the cannula into the proximal end of the severed vein and holds it there, while the assistant releases his grasp around the arm above. The funnel should be held four feet above the patient, and should be refilled before entirely empty. While the assistant fills the funnel the operator compresses the tube lest air-bubbles be drawn into the vein. In this way from one pint to two quarts of fluid can be inserted into the vein. Having completed the operation, the proximal and distal ends of the vein are ligated. The skin wound may be sutured or left open under an iodoform-gauze dressing, according to the cleanliness of the technique.

## MENSTRUATION AND ITS ANOMALIES.

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### MENSTRUATION.

**DEFINITION.**—The flow of the menses. A periodic function of the female generative organs, consisting in a bloody discharge from the uterus. It occurs, on the average, every twenty-eight days, and continues from one to six days. Menstruations extend over from thirty to thirty-five years of woman's life, and this time is known as the period of the "genital life."

**SYNONYMS.**—It is popularly known by the following names or expressions: "being unwell," "periods," "turns," "courses," "flow-ers," "terms," "sickness," "the reds," "menstrual flux," "troubles," "monthly illness," "the flow," "the catamenia," "the monthly purification."

**REGULARITY AND DURATION.**—The average time of the reappearance of menstruation, counting from the beginning of one period to that of the succeeding one, is twenty-eight days. This interval is not fixed; it is very elastic. In many cases it is less than twenty-eight days; in others, longer than four weeks, appearing however with punctuality. One woman may menstruate every calendar month or twelve times each year, while another may menstruate sixteen or seventeen times each year, yet both may be normal. Again, a woman may always have irregular intervals between her flowing and yet be perfectly well. A woman in good health, who asserted that her menses always appeared regularly, was directed to keep an accurate record of the intervals for one year. At the end of that time her report showed that they varied from twenty-four to thirty-five days. Being healthy and never having had her attention directed to the matter before, she had always called herself regular. The general rule, however, is that women menstruate every twenty-eight days.

Occasionally the menses appear at very irregular periods—*e. g.* two to five times in one year. One woman, in apparently good health, gave a history of an average of only two menstruations

annually for over seventeen years, her flow having no regularity; the two periods sometimes occurred within thirty days, no other menstrual flux appearing till the following year. Such cases are altogether unusual. A few women have been known to menstruate only in warm weather.

A normal menstruation may last from one to six days. Each woman is a rule unto herself in the matter of the duration of her monthly flow. Whatever her experience in this direction may be when she is in an otherwise healthy condition, is normal for her—a condition that cannot necessarily be laid down as the normal one for another woman. Three stages characterize the flow: 1st, the fluid is slimy and odorous, colored light or dark red by a small number of blood-corpuscles in a proportionately large amount of mucus; 2d, the fluid is almost pure blood; 3d, the fluid becomes lighter colored, its constituents being similar to those of the first stage. Exceptionally, the third stage is followed by another flow of pure blood lasting one day, to be followed by a light-colored mucus discharge, lasting thirty-six to forty-eight hours.

Very commonly, in girlhood, the approaching menstruation is heralded for two or three years by certain disorders occurring with monthly periodicity. It is not at all rare at this age to meet with very obstinate symptoms, such as headaches, epileptic fits, digestive disorders, or cutaneous affections, for whose treatment the usual remedies fail. The writer encountered in a girl of fifteen years of age, before the menses had appeared, an attack of facial erysipelas which recurred every twenty-eight days for a period of fourteen months. For such maladies medical men are in the habit of prophesying a cure when menstruation is established—a fact that experience verifies. As the time for the appearance of the flow draws nigh the nervous system becomes more irritable; there is general uneasiness and an alteration of the moral character. Commonly there is much languor, flushing, sensation of fulness, and disturbed or unnatural, heavy sleep, these symptoms continuing for a longer or shorter period. Immediately preceding the first flow there is much pain and weight, with fulness in the head and pelvis, and throbbing and swelling of the mammæ. Often the discharge is not at all regular to the month for the first half year or so, passing over a month or longer; yet the usual prodromic disturbances, enumerated above, are found to observe the lunar intervals quite regularly. In many young women the precursory

PLATE XI.

Fig. 1.

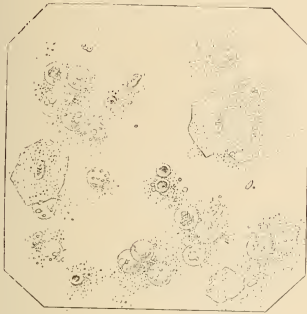


Fig. 2.

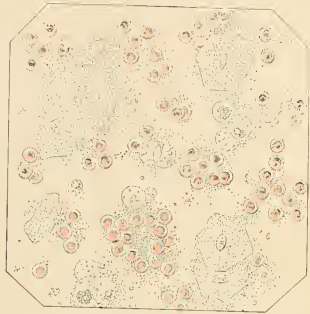


Fig. 3.

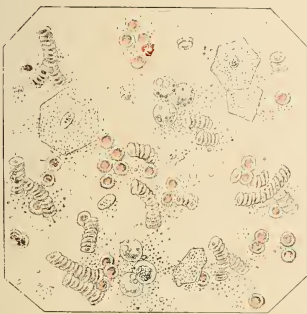


Fig. 4.

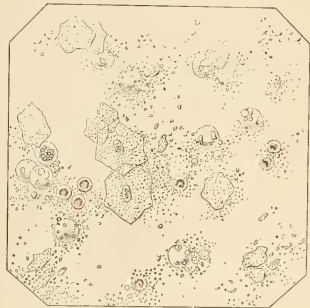


Fig. 5.



Fig. 6.



Fig. 7.



Microscopic view of Menstrual Fluid at different periods of Menstruation (Figs. 1, 2, 3, 4). Fragments of Endometrium cast off ten days after Menstruation (Figs. 5, 6, 7).





phenomena above mentioned are so slight or evanescent that no attention is paid to them. Slight choreic movements and an elevation of temperature may accompany the first menstruation.

The menses usually appear in American women at the fourteenth year. The colder the climate the later does menstruation become established. The average time of its appearance in temperate climates has been set at between twelve and eighteen years, from thirteen to twenty-one for cold climates, and from eleven to fifteen for hot climates. City girls menstruate earlier than girls who live in the country. Brunettes are said to menstruate earlier than blondes. Precocious menstruation is often seen at ten, nine, and even as early as eight years of age. Cases of much earlier appearance have been frequently reported. One case is recorded in which the menses appeared within the "first few months after birth" (Charpentier). On the contrary, there are women in whom menstruation is delayed.

#### MENOPAUSE, OR CHANGE OF LIFE.

**DEFINITION.**—The cessation of the menses is called the "menopause." By the term is meant that period in a woman's life when she stops menstruating.

**SYNONYMS.**—Its synonyms are the "critical time," the "turn," the "change of life," the "dodging-point," and the "climacteric."

**DESCRIPTION.**—The menopause includes a very elastic period of time in a woman's life. It may be very brief and abrupt, or it may extend over a long period of time, as three or more years. The typical development of the menopause consists in the irregular occurrence of the menstrual flow. Instead of appearing at the usual time, it will be delayed a few days or will pass over to a second period or longer, and then occur about as usual in the amount of the flow and accompanying symptoms. This menstruation will be followed by similar irregularity, or perhaps by one or more flowings, regular as to the intermenstrual interval and to the amount of the discharge and with the usual accompanying symptoms. This irregularity of the discharge may continue for a period of over one year, or to three, or even five years, when the flow disappears entirely, never to be seen again.

Occasionally it happens that women, menstruating regularly, almost to the day, experience a sudden and complete disappearance

of this function. Such an experience in the change of life is altogether exceptional.

The menopause may be said to include all of that period of time, intervening between the beginning irregularity of menstruation and the complete cessation of the flow, with the subsequent restoration of health. At this time the vague nervous symptoms which accompany the disturbances incident to the change of life are ushered in. Where these exist, depending upon the approaching menopause, they must be included in this period. During this space of time, very often, different symptoms are produced in different women.

These symptoms include manifestations or perversions, especially of the nervous system, and are shown in the form of vertigo, faintness, flushes, cold hands and feet; in the digestive system, by gastric fermentative dyspepsia, tympanites, constipation or diarrhea; in the circulatory system, by palpitation, syncope, and vicarious hemorrhages; in the cutaneous system, by sudden, severe and oftentimes offensive sweatings; in the mental realm, by loss of memory, irritability of temper, fear, apprehension, melancholia, and hysteria; by changes in the physique, the development of hair on the chin and face, flaccidity of the breasts, and the great increase of omental and abdominal fat. Very many other symptoms might be mentioned. Pelvic and lumbar pains, such eruptive conditions of the skin as appear at the age of puberty, pruritus vulvæ and colic, are often encountered.

A sallow, chlorotic, or plethoric state, or a nervous condition entirely unusual in the patient, may characterize her at this period. Leucorrhea is one of the most common symptoms during the change of life. An awakening of sexual desire, quite unknown during previous years, which is often looked upon with a sense of shame and degradation by its possessor, is not uncommon in women undergoing the menopause.

It must be distinctly understood that the symptoms enumerated above are not all to be found in every woman at the change of life. They include the principal disturbances observed at this time in a large number of women. The ones most commonly encountered are the manifestations exhibited by the nervous system. The one symptom of all those enumerated that seems to be well-nigh universally experienced at this period, is flushes; few women escape them. Next to them in frequency may be mentioned the disturbances of the alimentary tract.

Some women experience a multitude of these symptoms, while others seem to escape nearly all of them. Their cause would seem to reside in the sudden congestions of certain areas of the nervous system, through the non-escape of the customary monthly bloody discharge. Their relief is often experienced by vicarious hemorrhages from the nasal mucous membranes, from hemorrhoids, by a free diarrhea, or a profuse leucorrhea.

The sudden cessation of the menses is frequently associated with an abrupt invasion of the nervous system, as fright, shock—mental or moral—or by some septic malady, as uterine and tubal disease, the essential fevers, gout, or rheumatism.

The symptoms accompanying artificial menopause following the removal of the uterine appendages are usually more prolonged, lasting often for years. The change is more stormy, all the symptoms being exaggerated.

A stormy, irregular, or delayed menopause should excite in the attending physician the suspicion of some pathological condition. This is the time of a woman's life when malignant disease of the uterus or its appendages is most likely to manifest itself, and usually the first indication that there is any abnormal condition, is seen in the behavior of the establishment of the menopause. When this has once become established, all the tissues being healthy, there should never be a return of the bloody show. Not only should the periodical bleeding cease, but all vaginal discharges become abolished. If uterine bleeding occurs after the establishment of this condition, one of two diseases is most likely to be found—either fibroma or malignancy, with the chances largely in favor of malignancy, especially if the woman be a multipara. In such cases the attending physician should carefully exclude these conditions by physical and microscopical examinations.

The importance of carefully watching a woman through this stage of her life cannot be dwelt upon too emphatically. It is commonly the practice for physicians to attribute all the ills and complaints of such a patient to the menopause. If untoward and unusual symptoms appear, they must be studied carefully and their cause discovered if possible. Whatever pathological condition is found must be dealt with as it would be at any other period of a woman's life.

*The time of the cessation* varies with the climate, to a certain extent; the colder the climate, the later does the menopause occur.

The average time of the termination of a woman's menstrual life is in her fifth decennium. Variations from this, in recorded instances, extend from the twenty-second to the eighty-second year. Such extremes are altogether exceptional and unusual.

Women who begin early in life to menstruate usually pass the "climacteric" late in life. Those who begin late to menstruate pass the menopause comparatively early. Exceptions to both these statements exist, but they compass the rule in a large range of observations.

Heredity seems not to be free from influence in determining the time of the menopause. As the mother was in this particular, so the daughters are very apt to be. Compliances with this rule are more numerous than are the exceptions.

**PATHOLOGY.**—The involutional changes in the pelvic organs at the menopause are precisely the reverse of what is seen at puberty. The vulva becomes flattened and shrivelled through absorption of its subcutaneous fat. The dimensions of the vagina become contracted in every direction, and, in the majority of women, the hour-glass contraction is seen at the junction of the middle and upper thirds of this canal. The uterine walls atrophy, the cavity diminishes, and the cervix contracts greatly, sometimes almost disappearing. The Fallopian tubes diminish in size in all dimensions and even become obliterated. The ovaries shrivel and shrink in every diameter, even to the point, apparently, of their complete disappearance. Their envelope becomes wrinkled and folded in, contracting and pinching the walls of the Graafian follicles, which appear as little grayish pouches. The mammary glands shrivel and become greatly flattened in the majority of women.

**DIAGNOSIS.**—It is an easy matter to make a diagnosis of the menopause. There is one pathognomonic indication of the presence of this condition which is invariably found in all cases. If every disease or condition requiring the skill of a physician had but one symptom so clearly pathognomonic as the climacteric possesses, the practice of medicine would be infinitely easy. In all cases of the change of life this one indication, never absent, is the interruption to the regular and stated appearance of the menstrual flow. This interruption does not always present itself in the same manner. It usually appears in lapses, of greater or lesser degree, in the appearance of the flow. The habit of each woman as to the regularity of her menstruation must be learned, and from that habit

comparison instituted. Women often consult their physicians, supposing themselves to be passing through this period of their lives, so much feared, when inquiry reveals the fact that their menstruations are perfectly normal in the date of appearance, the amount of discharge, and the accompanying symptoms. Such patients, irrespective of their age, can always be assured that the much-dreaded period has not yet arrived.

The symptoms of the climacteric are multiform. The principal ones have been enumerated under the description. The test of the pathognomonic value of these symptoms is shown by the relief experienced by a profuse flow after a protracted amenorrhea of several weeks or months. These flows relieve the congestive state which is so productive of perturbed functional conditions. Following them is a cessation of a number of those symptoms that have become gradually established during the period of amenorrhea.

Organic diseases must carefully be excluded in the diagnosis of the menopause. For instance, to attribute a pyrosis and vomiting to the nervous aspect of the change of life, when an incipient gastric carcinoma is present, would be an unfortunate exhibition of diagnostic carelessness. The most careful and painstaking examination should be made in every case. Methodical examination of each organ is demanded. In this way only can organic disease wholly foreign to the climacteric be excluded. Failure to detect incipient pathological developments may result in disaster and death.

**PROGNOSIS.**—The prognosis is generally good. Where the germs of disease have existed previously, organic disorders may be started into activity and developed at this time. This is perhaps especially true of dysplasmatic growths. It is frequently observed, in highly neurotic women, in whom an hereditary taint of insanity has been previously recognized, that this disorder may develop at this time.

Generally speaking, the prognosis is satisfactory. It is exceptional that the troubles of the menopause are anything more than temporarily active.

**TREATMENT.**—The treatment is governed wholly by the indications present, and thus becomes symptomatic.

The axiomatic principle of the treatment of all disorders holds true in the management of the menopause, and that is to make waste and repair as nearly equal as professional skill will permit. This involves a most careful attention to the secretions, the excretions, and the blood state. Women suffering from a deficiency of



secretions, from a retention of excretions, or from impoverished blood, are sure to present many serious symptoms at the menopause.

The state of the alimentary tract demands particular attention. The fermentative dyspepsias are productive of more symptoms at the change of life than at any other period. Gastric lavations, creasote, salicine, corrosive sublimate, and other antiseptic remedies are indicated. A tender liver and chronic constipation call for daily laxatives. Cascara, compound liquorice powder, Hunyadi salts, Rochelle salts, and other salines are highly useful. The salines are especially indicated when anemia is not too profound, because their depletory action lessens congestion, an effect greatly needed at this period of a woman's life. Daily defecation should be insisted upon. Constipation, producing numberless reflexes and leading to fecal anemia, is a most deplorable condition and should not be tolerated.

The renal system is carefully to be considered. Renal insufficiency must be corrected. Lithemia may be eliminated by the free use of lithic-acid solvents, as the citrate of potassium or lithium. Lithic acid is the parent of many neuralgias and mucous-membrane disorders. Ignoring its presence frequently defeats the physician's treatment.

The cutaneous system should not be ignored. Frequent warm baths are useful. Above all, the skin should be protected from changes of temperature by suitable underwear. Chilling the surface of the body facilitates many minor internal congestions, which can be avoided by proper attention to the clothing. The systematic use of general massage and Turkish baths invites the blood to the skin, tending thus to equalize the circulation and to relieve internal congestions.

The condition of the heart demands attention in many cases. One of the most common complaints is paroxysmal tachycardia, which comes and goes erratically, lasting when present from minutes to days, the intervals of absence varying similarly. The attacks come on without warning, even during sleep, accompanied by violent action of the heart, pulsation of the carotids and aorta, cephalalgia, and flushes. A consuming fear of apoplexy or sudden death prostrates the patient. Her general state becomes demoralized by repetitions of the attack. Sleep is disturbed by horrible dreams, and she becomes the victim of general nervous depression. Occasionally œdema without albuminuria is observed. These at-

tacks generally do not depend upon organic cardiac disease, but upon local congestion of the heart-centre in the medulla oblongata, doubtless a reflex, in the majority of cases, from the alimentary tract. This statement is confirmed by the relief following the use of remedies addressed to the digestive apparatus.

All cases complicated with cardiac symptoms demand a most careful examination of the heart. Severe and long-continued menorrhagia is often associated with feeble heart. A fatty heart, as well as a feeble heart, is attended with impeded circulation, as is shown by œdema, albuminuria, dyspnea, and palpitation. It is a grave error to attribute such symptoms to nervousness or hysteria or to the change of life.

The blood state frequently demands attention. Anemia is often caused by the dyspepsias and constipation. When it arises from hemorrhages, especial attention should be given to the most absolute quietude in bed and to hemostatic measures. Blood-poverty is the cause frequently of the most annoying and obstinate functional disturbances of the nervous system; hence its correction is of the utmost importance. Where plethora exists venesection is in many cases most urgently demanded. Bloodletting is a lost art to-day; where it is inadmissible, saline cathartics can freely be used. Bleeding from the arm or from the cervix uteri gives more speedy and protracted relief than any other measure; it rarely does harm. Leeches can be used over the region of the round ligament at the external abdominal ring, or at the anus, in cases of ovarian or uterine congestion.

Mental therapeutics should not be ignored. The depressing emotions exert a deleterious influence on woman at this period of life. Hence worry, care, anxiety, and unnecessary responsibilities should be cast aside as much as possible. Social diversions, amusements, and congenial occupations ought to be encouraged. Opportunities for depressing introspection should be guarded against sedulously.

The nervous symptoms so common at this time, as flushes, tremblings, headaches, etc., dependent on local congestion of certain areas of the nervous centres, are best relieved by the bromides. These agents decongest and benumb, hence their wonderfully satisfactory action in women passing through the change of life. The effects of these preparations cannot be too highly praised. The choice of a bromide is not altogether inconsequential. The ammonium bromide

is very speedy in its action, but it is far too evanescent. The potassium bromide is much slower and more permanent in its effect, but its depressant influence on the heart in large doses is objectionable. A more pitiable combination than a woman suffering from severe nervous manifestations in the menopause, combined with an induced cardiac debility, is difficult to imagine. The sodium bromide is the best of all bromides to use. It is markedly diuretic and does not materially depress the heart. The tendency of the bromides to produce acne can be largely averted by the use of arsenic, in the form of Fowler's solution, after meals. The effects of the bromides are wonderful in relieving pains, flushes, nervousness, and mild melancholia. Used in combination with camphor, their anaphrodisiac action, where needed, is most gratifying. Too much caution against the miscellaneous use of narcotics and diffusible stimuli cannot be entertained. The use of opium and chloral is especially objectionable, unless the suffering becomes unendurable, when they should be used for the briefest period of time and interdicted by the physician's specific ordering. The objection to their use is the fear of establishing the opium or chloral habit at this impressionable time, when a woman will resort to anything to secure relief, irrespective of consequences.

From the foregoing remarks it will be seen that the object of therapeutic attack must be sought for, chiefly, outside of the pelvic organs. It is understood that uterine, tubal, and ovarian congestions, when found, are to be treated *secundum artem*. The remainder of the treatment of women at the climacteric is purely symptomatic. There is no specific treatment of the menopause.

*Composition and Quantity of the Menstrual Discharge.*—The flow at first is mucous in character, gradually changing color till it becomes distinctively sanguineous. It has an acid reaction from phosphoric and lactic acids; a peculiar odor, due to fatty acids; and consists of blood (venous), serum, ciliated vaginal epithelium, and the débris of an endometrium necrosis, mixed with pigment, broken-down blood-disks, and granular detritus. It is ordinarily non-coagulable, owing to the mucus that it contains. When there is disproportionately too large a quantity of blood present, as in menorrhagia, coagulation is common. Hence, when women flow too freely, as from a diseased condition of the pelvic organs, it is exceedingly common to see coagula discharged; therefore, the attempt to

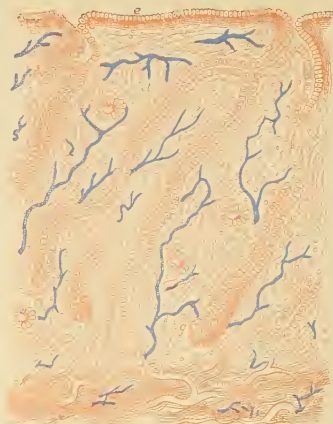
prove that coagula in the menses indicate an abortion is fallacious. At first in normal women the discharge is pale, at the height of the flow, deep red, and toward the last, again pale. In chlorotic women is seen the pale flow, or *menstruatio alba*. It is erroneous to say that the discharge is poisonous, having an injurious effect on living things, as men, animals, and plants. Its mucous element possesses at times an injurious and irritating effect on the male urethra, causing a peculiar chronic urethritis. One can but be impressed by the wisdom of the Mosaic edict forbidding cohabitation with a menstruating woman.

Some women are said to be free from the function of menstruation. Close inquiry, however, usually reveals the fact of a periodic white discharge occurring from their genital organs.

*The amount* of the discharge varies from four to eight ounces. The recorded observations of extremes vary from two to eighteen ounces. Many conditions cause variations in the amount in the same women, as health, diet, exercise, climate, and sexual excesses: consequently there is nothing fixed. Hippocrates thought the Grecian women shed twenty ounces at each period. Galen averred that the Romans lost eighteen ounces. Meigs stated fifty years ago that many healthy American women lose twenty-one ounces as the normal and regular elimination. Such amounts must be regarded as far above the average.

*The source* of the menstrual discharge is the endometrium. It is the consequence of hyperemia of the pelvic organs: the uterus, tubes, ovaries, and broad ligaments. The contraction of the muscular fibres of these organs compresses the veins, retarding the flow of blood and increasing the tension in the capillaries, which rupture and give rise to the appearance of the menstrual flow. Under the influence of this congestion, the volume of the uterus increases a quarter, a third, and sometimes more. At this time the pampiniform plexus becomes so distended that in lean women it can very often be detected by conjoined manipulation. The turgid uterus undergoes a true anorthosis. The cervix becomes larger and softer. The endometrium swells, becoming folded and mammillated. The epithelia become loosened and pushed off. The hypertrophied mucous glands become the seat of an abundant secretion. The lining membrane of the fundus yields the largest part of the catamenial discharge, because of its looser anatomical texture, while the cervical canal, having more resisting vessels, which do not burst,

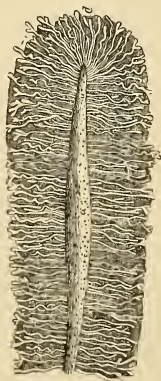
FIG. 28.



Vertical Section through Normal Mucous Membrane of the Uterus: *e*, columnar epithelium, the cilia not represented; *gg*, utricular glands; *ct*, connective tissue; *v*, blood-vessels; *mm*, muscularis mucosae.

yields a purely mucous discharge. The canals of the tubes are sometimes filled with blood likewise, thus increasing the menstrual flow. The vagina becomes darker in color and the increased vascularity causes the mucous membrane to swell and to shed an increased

FIG. 29.



Menstrual Endometrium.



amount of mucus, having more or less odor. The vulva often becomes tumefied, and is sometimes the seat of mild pruritus, thus explaining the frequently experienced micturition.

The menstrual discharge, composed of blood, mucus, serum, epithelia, and the débris of granular detritus, is a very complex fluid. The endometrium, undergoing rapid degeneration, is shed in patches and shreds. It is called the *decidua menstrualis*. This decidua is developed from the upper part of the uterine mucous membrane, and does not involve the Fallopian tubes or cervix uteri. The shedding and the redevelopment of this decidua are matters involving much speculation. It is generally conceded at present that it is cast off in fragments—sometimes in one or two large pieces. Within a few days it is re-formed, and its shedding again repeated. Should conception occur, the *decidua menstrualis* becomes the *decidua vera*. The *decidua menstrualis* is a very important factor in membranous dysmenorrhea.

The *syndroma menstrualis* includes the attendant phenomena of a menstruation, preceding and accompanying it. They are both general and local.

*General.*—The entire glandular system is stimulated. The sudoriparous glands secrete increased, and in many women the odor of the perspiration becomes characteristically pungent. The bronchial glands secrete more actively. The alimentary secretions are increased in many women to such a degree that they are inclined to eat voraciously, while many other women have diarrhea at the outset of the menstrual flow. Pigmentary deposit under the eyes and on the nipples, genitals, face, and neck is common. An increased deposit of fat beneath the skin in most parts of the body very commonly accompanies the establishment of the genital life of woman, and all the contours become more rounded and graceful. The volume of blood is augmented and cardiac action and arterial tension are increased. Malaise and lassitude supervene. Many girls experience a nervousness bordering upon uncontrollableness. Alternate subjective sensations of heat and cold are often experienced.

*Local.*—The vulva becomes more prominent and filled out. The uterus and vagina enlarge. Pubic and axillary hair appear. The mammary glands increase in size and become sensitive, the nipples grow larger and darker. The pelvis becomes broader. The mental changes exhibit the occurrence of sexual desires, by the



development of more reserve and the abandonment of hoydenish ways. Increased micturitions, yawnings, cramps, and hiccough are common. Hemorrhages occurring at the same time from other parts are known as supplemental menstruation. Piles, if they exist, are more congested and nævi are deeper colored.

*Vicarious* or *ectopic menstruation*, or *xenomenia*, consists of a bloody discharge from some other organ than the uterus, either with or without a minimum menstrual flow at the same time. When the minimum menstrual discharge occurs, vicarious or supplementary menses takes place from the lungs, the nose, the alimentary canal, or the subcutaneous cellular tissue. Where there is no uterine hemorrhage, the vicarious menstruation may arise from the lungs, nose, alimentary canal, mouth, the surface of a sore, from an erectile tumor, the skin, the conjunctiva, the nipples, the gums, the bladder, the ear, or the stump of an ovarian cyst. The nose is the most frequent seat of vicarious menstruation. In menstrual hemoptysis it is of vast importance to exclude tuberculosis. Occurring from the skin, vicarious menstruation is called "hematidrosis" or "sweating blood."

*Retention* of menses, or *hematometra*, is an accumulation of the menstrual flow within the uterus, its exit being prevented by a defect of formation of the uterus, cervix, vagina, or vulva. Such cases may be denominated apparent amenorrhea. At first they are regarded as amenorrhea. Much pain characterizes them, and they may be regarded as practically to occupy a place between amenorrhea and dysmenorrhea. Every month the patient presents painful disturbance centering in the hypogastrium. Cephalalgia may occur, with flushing, accelerated pulse, emesis, intestinal and vesical disturbance, and leg pains. In a few days these phenomena subside, only to reappear in about twenty-eight days. The general health at length deteriorates. Sooner or later the abdomen swells. A mild degree of sepsis may occur, commonly hastening to a climax. Soon thereafter the physician is called to investigate, and an atresia is discovered.

Cases of *uterus bicornis* have been reported where one cornu was patulous while an atresia of the other existed, causing a retention of the menses. Decés reported in 1854 such a case wherein rupture and a fatal peritonitis occurred.

Cases of retention may be congenital or acquired. In the former there is some congenital defect or some condition acquired in child-

hood. In the latter the atresia most commonly follows parturition or syphilitic invasion.

The intermenstrual molimen consists of the presence, in some women, of all the discomforts of a menstruation without a bloody discharge, occurring midway between two monthly periods. Many women experience it in full intensity, while others have it in only a slight degree. Oftentimes therapeutic measures are necessary to control these intervening pains.

*Menstruation and Ovulation.*—Till within a few years these two functions were considered as one, the flow being regarded as the external manifestation of ovulation. At present this view is opposed by many writers. Formerly no one felt disposed to question the accepted theory that the ovaries controlled menstruation. After the removal of the ovaries became a common operation, it was found that nearly all women undergoing this procedure ceased menstruating, and then the conclusion was confirmed that the ovaries presided over the function of menstruation. Later it was observed that occasionally a woman was found who continued to menstruate after oöphorectomy. This led to questionings which threatened to uproot the time-honored theory of the interdependence of menstruation and ovulation. Very soon thereafter one prominent laparotomist boldly announced his belief that the Fallopian tubes controlled the function of menstruation, his argument being, that when the ovaries and tubes were completely removed, menstruation never appeared thereafter. He thus explained that menstruation after oöphorectomy occurred because not all of the tubes was removed. In time it was found that even after the removal of ovaries and tubes cases of menstruation or of monthly flow were occasionally reported; hence the true explanation of the cause of menstruation seemed not to have been supplied. Further speculation followed. The latest theory of causation advanced, is, that neither the ovaries nor the tubes control menstruation. Instead, it is the tubo-uterine plexus of sympathetic nerves which causes the appearance of the menses. Removal of the ovaries does not always annihilate the integrity of this plexus, nor does every case of removal of the tubes; therefore where this plexus remains uninjured the monthly flow will continue to appear. Speculation on this much-mooted question is still rife. The following statements may be accepted as the status of professional opinion on this subject at this time: 1. That ovulation and menstruation are closely associated, but not necessarily

- interdependent; 2. That ovulation may occur without menstruation; 3. That conception very often occurs without menstruation.

Pertinent to the last statement may be mentioned the fact that many women go for years without menstruating, while they are bearing children in rapid succession and suckling them. One case, reported in 1879, showed that a peasant-woman married before menstruation began, became pregnant and bore and suckled sixteen children in the succeeding twenty-one years, when, at the age of thirty-six, she menstruated for the first time. Afterward in her widowhood she menstruated regularly. It is claimed that ova are developed in the earliest infancy, during lactation, and even after the menopause. Evidence has repeatedly been adduced, in reported cases, of ovulation occurring during pregnancy. Facts such as these supply irrefragable evidence that ovulation occurs without producing menstruation. The final settlement of the relation existing between menstruation and ovulation is still waiting unassailable demonstration.

*Menstruation during Pregnancy.*—When a woman is pregnant her menstruation does not appear; that is a rule, to which, however, there are exceptions. The exceptions are atypical: some women menstruate once after conception, some twice, and others oftener. Whether the flux is a pure and simple menstrual flow has perhaps been questioned, but the fact is indisputable that it has appeared promptly on time and has acted just like a genuine menstrual flow. Such discharges of blood have been called “accidental hemorrhages,” and not the typical bloody flow of menstruation. The writer recalls a woman whom he has attended in five out of her six confinements, and in whom the calculation of the time of her delivery was always computed from the date of quickening, it being impossible to determine when conception occurred, because she always had her monthly flow up to the fifth month of gestation.

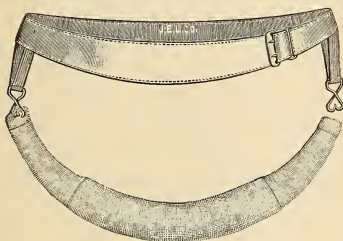
The *decidua vera* and the *decidua reflexa* do not coalesce and occupy the entire uterine cavity till the end of the third month of gestation. Till that time it is easily understood whence arises the flow—namely, from the uninvaded endometrium. After the third month, however, the menstrual flow must arise from the cervical canal, and it will be small in quantity—a fact which comports with observations. These remarks in no way apply to cases of bloody flow in pregnant women who have uterine cancer, an inflammatory or

congested cervix, a polypus or cardiac disease, nor to cases of extra-uterine pregnancy. Cases are related in which patients habitually menstruate only when pregnant. That a woman can menstruate and ovulate after fecundation is shown by superfetation.

#### MANAGEMENT OF MENSTRUATING WOMEN.

Physicians should instruct mothers to secure rest and quietude for the girl entering on her menstrual experience. Ignorance of this function on the part of the girl is highly culpable in the mother. Many a young woman has injured herself irreparably by attempts at concealing her flow, supposing it to be something disgraceful. Thus, washing in cold water, in brooks and streams, has been done to conceal a supposably shameful condition.

FIG. 30.



Menstrual Pad.

Where it is practicable the young woman should remain in bed two or three days or longer during her menstruation. She is the better for such enforced quietude and freedom from the usual wear and tear of her nervous energy, incident to active youthfulness, at a time when her system is learning to accommodate itself to a new experience. Books, magazines, and pictures can entertain her during these days of restraint. She becomes accustomed to the monthly quietude and accepts it without a murmur. Every woman is better off for such resting, and it should, whenever possible, be secured for girls, during the first year, at least, of their menstrual life. Where it is impracticable, her duties should be rendered as light as possible, and everything in the way of severe exertion should be avoided. It is, unfortunately, only too often the case that no rest nor lessening of arduous duties can be secured to young women. Such women grow old too soon.

## AMENORRHEA.

DEFINITION.—Amenorrhea is the absence of the menses in adult women who are not pregnant, have not passed the menopause, or do not suffer from retention of the menstrual flow. It is not, *per se*, a disease. It results from a variety of causes which may affect either the system at large, or the genital organs in particular. Thus we may have amenorrhea resulting from general as well as from local causes.

*Complete amenorrhea* is the total absence of menstruation, whereas *comparative amenorrhea* is that condition in which the menstruation appears only occasionally. *Primary* or *permanent* amenorrhea is the expression used to describe cases wherein menstruation has never occurred. *Secondary, transitory* or *accidental* amenorrhea has been called *suppressio mensium*.

CAUSES.—To simplify the causation of all amenorrheas the etiology may be reduced to the following:

Normal menstruation requires the following conditions:

1. A normal condition of the nervous system;
2. A normal state of the blood-supply;
3. Integrity of the entire genital apparatus.

With these three conditions in existence a woman will menstruate normally and regularly. Serious interference with one or more of them will produce amenorrhea.

The nervous system presides over all functions of the body. When it is disordered seriously, the functions are in turn seriously disordered. Menstruation must be regarded as a reflex act. Any break or interference in the cycle of the reflex movement may suspend the menstrual flow entirely. Hence amenorrhea may arise through defects in the nervous system.

It is almost unnecessary to state that there must be enough good blood present in the system before a woman can menstruate normally. Its absence is one of the most prolific causes of the cessation of the flow.

That the entire genital system must be in a normal condition to permit menstruation is self-evident. The organs must all be present, free from stenoses and from degenerative structural changes. In enumerating the following causes of amenorrhea it will readily be observed that each bears upon one or more of the three conditions. Therefore, bearing them in mind will enable the stu-



dent and practitioner to arrange the various causes systematically and in order. The popular idea that amenorrhea is productive of dangerous constitutional conditions, as consumption, dropsy, chlorosis, nervous prostration, and the like, will clearly be understood to be a reversal of cause and effect.

Whatever seriously affects the general nutrition may stop the menses temporarily. Thus, an attack of typhoid fever or any other serious disease may cause amenorrhea for several months. Through such illnesses the function of hematosiis is impaired, preventing the general nutrition of the system. Thus the nervous system with its infinite reflexes fails to perform all of its functions. Menstruation, doubtless a reflex, shares the neglect whenever the general nervous system is not well nourished. The diseases that most frequently cause amenorrhea are chlorosis and pulmonary tuberculosis. It is produced by the anemia that follows the essential fevers, pneumonia, Bright's disease, diabetes, morphinism, cancerous or malarial cachexia, alcoholism, hydrargyrisim, acute or chronic surgical affections, and the onset of profound syphilitic invasion.

Extreme mental emotion, as fright, grief, anxiety, or great anger, may suspend the function of menstruation. Women anxious, from misconduct, to menstruate, will often fail to do so. Conversely, cases of cure by some sudden emotion have been recorded. Prisoners and insane women are often victims. *Hysteria gravior* is frequently characterized by the cessation of the menses. The emotional amenorrhea of the newly-married is well known. The anxiety of the woman intensely desirous to become a mother will cause a cessation of the menses, often accompanied by tympanites.

Pelvic disorders may cause amenorrhea, as imperfect or rudimentary development; absence of the ovaries or uterus; cystic ovarian degeneration; pelvic peritonitis with its resultant adhesions, deforming and displacing the general aspect and position of the pelvic organs; acute metritis and endometritis, chronic diseases of the uterine parenchyma and parametrium, and hyperinvolution of the uterus following pregnancy.

Girls who, during the period of active development of the generative organs, are urged on in intellectual studies without a sufficiency of active exercise, fresh air and good healthy hygienic surroundings, very commonly suffer from amenorrhea. The *vis nervosa* necessary to physical development is perverted and expended in mental work, resulting in delayed or imperfectly de-



veloped generative organs. Being the last developed, these organs are the first to fail in fulfilling their function.

Great changes in the mode of living often develop this condition. Thus, nurses in training-schools at times cease to menstruate for a period of two to six months after entering upon their new mode of life. There is often a suppression of menstruation following a sea-voyage.

Rapidly increasing obesity with its resultant anemia, insufficient exercise, and luxurious living, are all well-recognized causes of comparative amenorrhea.

One of the commonest causes of acute amenorrhea is exposure to cold during a menstrual period; cold bathing, sitting or lying in currents of cold air, sitting on cold stone steps, and a change of linen, are common modes of such exposure.

Traumatic injuries can also cause this condition. Nearly every physician of experience can recall some case of amenorrhea caused by a blow or injury.

Renal insufficiency is often a cause. Embryologically, the urinary and the generative organs arise from the mesoblast in the ovum. It is an easy matter to understand that interruption to the physiological action of one set of these fundamental organs may lead to the interruption of that of the other. The logical sequence of cause and effect, herein, may be assailed, but the therapeutic proof is brilliant and incontestable. The writer has repeatedly seen cases of comparative amenorrhea, with no other discernible cause than renal insufficiency, corrected by the use of stimulating diuretics.

DIAGNOSIS.—All cases of amenorrhea must be carefully examined, even under complete anesthesia.

First, it should be definitely settled whether the case is primary or secondary. Primary amenorrhea, where menstruation has never occurred, at once leads to questioning whether the uterus, tubes, and ovaries be present in their entirety. If present, it becomes necessary to ascertain whether an atresia of the cervical canal, vagina, or vulva exists. If the prodromic symptoms of a menstruation have never been present, the suspicion of the absence of one or more of the generative organs will strongly obtain. If these prodromic symptoms have been present, repeatedly, at lunar intervals, with no succeeding menstrual flow, the suspicion is at once excited that an atresia exists, and that the menstrual flow is retained within the genital passages.

If the case be one of secondary amenorrhea, the cause must be sought for both within and without the pelvis. Primarily, pregnancy and lactation must be excluded. Within the pelvis there may exist hyperinvolution of the uterus following pregnancy—*i. e.* a senile uterus. Acute metritis, acute endometritis, or an intense chronic metritis may be found. There may be atrophy or cystic degeneration of both ovaries. Pelvic peritonitis may be present. Either one or more of these pelvic maladies may cause an amenorrhea, although the reverse usually obtains in the inflammatory conditions.

Without the pelvis will be found the larger proportion of causes of the cessation of the menses. Interferences with hematosis through disease and perversions of digestion and nutrition, are the commonest of all causes of secondary amenorrhea. A careful and minute inquiry as to the anamnesis of this condition will lead to the particular line of approach of the causal anemia. This inquiry should be particular, systematic, and exhaustive, because without it the practitioner will only too frequently fail to learn the cause, and consequently to institute the proper treatment.

After securing the completest possible case-history, confirmation thereof will be afforded by a thorough physical examination. Sometimes such an examination will reveal an organic valvular heart-lesion, to the astonishment of the physician. If the investigations are carried no further the treatment will *not* include a slowly-advancing Bright's disease, for example, which has led to the cardiac lesion, and the physician will fail in restoring the menses as, perhaps, have other practitioners in the same case. Such physical examination should include *the entire system*; especially the thorax and abdomen. Only the superficial observer will confine his examination to the pelvis. It is surprising to note how often a hydrothorax or a tuberculous kidney will be found as causative factors in amenorrhea. The urine should always be analyzed. The systematic examiner of his gynecological cases will be astonished at the discoveries oftentimes in his patients—discoveries that have so easily eluded former medical attendants—discoveries that shed an entirely new light in the way of cause and effect.

The PROGNOSIS depends entirely upon the cause. Amenorrhea from the absence of pelvic organs is incurable. Pulmonary tuberculosis and other incurable disorders, as advanced Bright's disease or diabetes, present a gloomy prognosis. In cases of hyperinvo-

lution of the uterus the prognosis is unfavorable. Pelvic inflammations, amenable to treatment, afford a more promising prognosis. In short, only where the cause can be removed is there reasonable hope of restoring the menstrual flow.

TREATMENT.—It must be borne in mind that many cases of amenorrhea exist without producing any kind of disturbance of health. The absence of menstruation is simply a part of a constitutional state. There is no local treatment that will re-establish this function. In patients rapidly progressing along the way of recovery through general treatment, local treatment will often be followed by the restoration of the menses, but this is not *post hoc propter hoc*. The uterus can easily be made to bleed, but this must not be confounded with menstruation. In truth, we cannot predict positively in any given case of amenorrhea that our treatment will restore the menses.

Our patient must be regarded as an entity possessed of a multiplicity of organs, and any and all treatment must include their functions and interdependence. The moment the physician loses sight of this general fact, his treatment becomes the merest empiricism. The fact ought not to be ignored that a remedy given to a woman progressively improving under general treatment, and who is about to menstruate, will unjustly be pronounced an effective emmenagogue when in reality it had nothing whatever to do with the restoration of the menses. It is incontestable that many drugs have thus been endowed with a virtue never possessed.

The cause always determines the treatment. When pregnancy exists, no treatment is to be instituted. Upon this point the practitioner must ever be on his guard. Designing women often consult the physician for amenorrhea when they know that they are pregnant, hoping that something will be done "to bring on their courses" and thus interrupt the gestation. In all cases when in doubt the physician should either decline to give local examinations and treatments, or simple tonics may be administered with the instruction that the patient return in a month. The patient, seeing the object of her desire so far removed, will not call again.

The necessary anamnesis obtained and examination having been made, the point of therapeutic attack will, as a rule, have been exposed. Cases amenable to treatment should be treated ever and always with the one fundamental object in view—viz., to restore the normal physiological balance, and to render waste and

repair equal. To this end it is necessary to restore functions where needed; to increase the activity of the skin, kidneys, bowels, liver; to augment the volume of the blood with hematic remedies; to improve and invigorate the energy of the general circulation by out-door exposure and exercise; to secure the needed daily regeneration of the nervous power by sufficient sleep, and to protect from undue exposure an already enfeebled system by a sufficiency of simple and sensible clothing. A gynecologist doing this sort of work invades the wide domain of the general practitioner.

A daily laxative, like the extract of cascara sagrada, or the compound liquorice powder, at bed-time, and a tonic after meals, as the elixir of iron, quinine, strychnia, and phosphorus, or arsenic, or the mineral acids, will be required in the majority of cases. If renal insufficiency exists, a stimulating diuretic must be added to the laxative and tonic. A good diuretic is the combination of the potassium acetate with digitalis, or a quarter of a grain of calomel, before meals, and the effervescing granular salts of lithia citrate or carbonate, after meals.

With the reconstruction of the general health the menses will usually return where no organic perversion or defect remains.

From time immemorial remedies have been vaunted for restoring the menses. To-day, with an improved knowledge of the pathology of amenorrhea, the number of emmenagogue remedies has become greatly diminished. Iron, manganese, and electricity enjoy the largest amount of favor as possessors of emmenagogue properties. Ergot, rue, savine, and the essential oils are now rarely used to restore the menstrual flow.

The use of iron has been mentioned. The binocide or lactate of manganese or the permanganate of potassium, in one-grain doses, three or four times daily after food, has found favor as an emmenagogue; it is alleged to determine an increased flow of blood to the pelvic organs. Santonine, in ten-grain doses at bed-time, has been used with success in chlorotic subjects where manganese has failed.

Electricity has been used to restore the menses by a number of gynecologists in the past decade. Its successes and failures do not yield the most unqualified enthusiasm in its use. Faradism may give gratifying results. Static electricity is commended in chloro-anemic girls. The continuous current is used with the positive pole over the lumbar or iliac regions and the negative

pole in the uterine cavity. Thus applied, it often produces an uterine hemorrhage, which is not always a true menstruation. In cases where the uterine changes, leading up to a menstrual flow, are present without apparently sufficient menstrual energy to eventuate in a normal periodical discharge of blood, electricity will undoubtedly precipitate the desired result. Unable to determine positively the presence of such uterine changes in a given case, the use of this agent must more or less be empirical.

Galvanic intra-uterine stem pessaries are oftentimes efficacious in relieving amenorrhea: they consist of alternate beads of zinc and copper arranged on a stem.

Intra-uterine stem pessaries have been successfully employed in restoring the menses. The mechanical irritation and cervical dilatation have doubtless contributed to impel more blood to the uterus and its adnexa.

Guaiacum has been strongly recommended in amenorrhea in subjects of marked rheumatic diathesis. The well-known action of capillary stimulation by this drug doubtless accounts for its efficacy in restoring the flow.

The allegation has been made that as strychnia favors muscular contractility, and thus can aid in rupturing the Graafian vesicles most advanced toward maturity, it favors ovulation. Its use as an emmenagogue in amenorrhea has been favorably reported.

Sodium salicylate has been successfully employed because of its power to produce pelvic congestion.

Oxalic acid, in half-grain doses three or four times a day, has been highly recommended and is very effective. It has been known to bring about a miscarriage when accidentally given during pregnancy.

Indigo has recently been very highly recommended in the treatment of this condition. It cured 13 out of 14 cases; the fourteenth was a failure because it was a case of pregnancy. Under its use the os uteri becomes soft and patulous, admitting the index finger.

The latest advocated method of treatment of amenorrhea is by psychotherapy. Every month brings reports of cures by hypnotism. These cures are obtained by the induction of the hypnotic state and subsequent suggestion. It is alleged that results truly marvellous have been obtained with the expectant attention induced by suggestion. In the present chaotic condition of the entire subject of psychotherapy, the writer is content with barely calling attention to hypnotism in this connection.



Marriage has been recommended as a suitable stimulant in some cases of amenorrhea. In view of the fact that we have no positive data upon which to base a prognostic success, such advice is questionable; its failure would entail mental misery on both parties to the marriage. Whenever we are consulted in regard to the marriage of an amenorrheic woman, a thorough pelvic examination is imperative. Should such a woman marry upon medical advice without an examination, she may discover, when too late, that she is unfortunately deformed, by the lack of a normal development of the generative organs. Such an eventuation has led to more than one tragic termination. It has also caused tribunals to declare nullity of marriage on the ground of error as to the sex of one of the parties.

Amenorrhea is merely a symptom of some general disease, except in those rare cases of malformation, and as such, requires no local nor constitutional treatment directed solely to the pelvic organs. In the vast majority of cases it causes no trouble whatever, the patient applying for treatment simply for the reason that the usual flow has failed to appear. The mere absence of the menses should be ignored, especially when no other symptoms arise.

#### MENORRHAGIA AND METRORRHAGIA.

DEFINITION.—The first of these two words is used to express an excessive menstruation; the second, for a flow of blood not only at the menstrual time, but between menstruations. Neither condition is a disease; both are symptoms of some well-defined pathological condition. The latter may be profuse or moderate. The patient who menstruates too freely is said to have menorrhagia, while one who sheds blood between the menstrual periods is said to have metrorrhagia. Women differ in the amount of the normal flow. What would be normal flow in one woman would be hemorrhage in another; accordingly, whatever the amount of flow a woman may have in health, during the first few years of her menstrual life, may be regarded as normal for her. In this particular each woman is a rule unto herself.

FREQUENCY.—Both of the above disorders are commonly met with. They may arise from many varying conditions. Any reliable attempt at the expression of the percentage of women who have menorrhagia or metrorrhagia cannot be made.

CAUSES.—The numerous lesions causing too great a discharge



of blood from the uterus demand most careful inquiry for their rational treatment. Each case of hemorrhage should be investigated independently for its cause. Indeed, all successful treatment will depend upon the finding of the cause. Frequently the same cause produces the two conditions. When the cause is an aggravated one it may occasion the continuous discharge of blood—metrorrhagia; during its process of disappearance, under treatment, it will be found that the metrorrhagia may be converted into menorrhagia, and that, in turn, may give way to the normal menstruation when the cause is entirely removed. It will thus be seen that it is a particularly difficult matter to differentiate between the causes of menorrhagia and metrorrhagia.

All causes of uterine hemorrhage may be classed under two heads, general and local.

The *general* causes involve general conditions, and are the following: purpura, plumbism, severe icterus, scorbutus, Bright's disease, the spanemia of obesity, phosphorus-poisoning, malarial poisoning, the early stages of tubercular invasion, cardiac disease, and oftentimes, plethora. Hemorrhage may occur in the progress of an acute fever. In the majority of the above-named general causes, the plasticity of the blood is so diminished that clot-formation is seriously impaired, and for this reason the loss of blood continues indefinitely. Such patients very often have periods of amenorrhea of indefinite duration, alternating with hemorrhages.

The *local* causes may be reflex or direct. In the former category actual disease may exist or be absent. Among these cases may be classed the hemorrhages incident to puberty and the menopause, to the first intercourse, to lactation, and to any powerful emotion. The direct causes of all menorrhagias and metrorrhagias are the ones that demand our attention in the vast majority of all hemorrhages. They include nearly every disease of the uterus and its appendages, as metritis, endometritis, subinvolution, granular cervix, retained secundines, retro-displacements of the uterus, fibroids, cancer, polypi, pressure outside of the endometrium, as from fibroid tumors and fecal accumulations, ovarian tumors, chronic ovaritis, chronic salpingitis, and acute pelvic inflammation.

Attention is called to another form of hemorrhage from the uterus, occasionally seen, where pregnant women shed blood from the second to the sixth month without miscarrying, and apparently without endangering the life of the child. Speculum examination

carefully made fails to reveal the cause. The gestation is not necessarily interrupted, especially under conservative treatment, if prolonged rest and quietude and careful abstinence from too active curative measures be observed. Women who have an habitual flow at what would be the menstrual period if they were not pregnant are not included in this class. The hemorrhage comes on at any time, and persists indefinitely, from a day to weeks, without interruption, apparently uninfluenced by anything that can be done.

**PATHOLOGY.**—From the conditions enumerated above it will be seen that whatever lesion induces too free a flow of blood to the uterus may become the cause of hemorrhage. Any one of these disorders existing alone may produce the flow; with several coexisting conditions the flow is still more certain to appear. Occasionally violent hemorrhage will be witnessed from the uterus, when a careful examination will fail to determine the cause.

**PROGNOSIS.**—If the cause can be found and removed, the prognosis is good. If the cause cannot be found, the treatment must be symptomatic and the prognosis uncertain. If the cause can be ascertained, but cannot be removed, its natural history will determine the prognosis.

Many conditions result from these hemorrhages. We thus have general anemia, sterility, extreme emaciation, neurasthenia, wrecking of the health, and occasionally, death.

**TREATMENT.**—The treatment of uterine hemorrhage is determined by the cause. It is not always possible to determine the cause; in which case it is necessary to treat the hemorrhage empirically. The treatment of cases when the causes are known will be taken up in their order.

When the causes are general, general treatment is required without interruption between the hemorrhages. For the treatment of these general causes the reader is referred to a work on general practice; therefore no attempt will be made to direct their management.

When a well-defined local cause is discovered, its treatment should be outlined according to the directions given for treatment in the appropriate article elsewhere in this volume. Thus the treatment of metritis, subinvolution, cancer, chronic salpingitis, retained secundines, and fungosities of the endometrium will be found fully described under their appropriate headings.

For the emergency of hemorrhage the number of remedies rec-

ommended in the past is very large. First of all, the patient should be put to bed, and compelled to remain in the horizontal position, with the hips and lower extremities elevated. The more severe the hemorrhage the more imperative is this measure. It will oftentimes be found that a hemorrhage nearly stopped will be brought back in all its fury upon the patient arising from the bed to answer, for instance, the calls of nature. Cold applied to the lumbar and sacral regions contributes to diminish and check hemorrhages. In very severe cases of uterine hemorrhage, cording the arms and legs close to the body will be found of service: by this means large volumes of blood will be kept in the extremities for a sufficient length of time to permit clotting of the blood in the openings of the blood-vessels within the uterus.

Of remedies used internally, the following may be mentioned: ergot, in twenty-drop doses, frequently repeated by the stomach, or in drachm- or two-drachm doses, with a drachm of deodorized tincture of opium by the rectum; ergotin given in pill form, or cannabis indica given to the point of producing mild hallucinations.

Various vegetable astringents containing tannic and gallic acids as their base, as catechu, kino, and hematoxylon, have been recommended.

The mineral astringents like alum, iron, and lead have also been used.

In the moderate, persistent, erratic hemorrhages occasionally observed in parturient patients, digitalis is perhaps the best remedy that can be suggested. It operates by increasing the arterial tension, thus diminishing the amount of blood going to the part suffering the hemorrhage. Ergot in such cases is to be avoided for fear of interrupting the pregnancy. Hydrastis canadensis, quinine, hamamelis, strychnine, and especially atropia, are remedies that have been used to control hemorrhage in the non-pregnant uterus. Atropia is administered in doses of  $\frac{1}{100}$  of a grain three times daily for several days, or in smaller doses if the patient be very susceptible to the drug. These drugs are all alleged to exercise an influence upon the uterine muscles. Oil of erigeron and oil of cinnamon are at times effective where other remedies fail.

Mineral acids have been recommended. The dilute sulphuric acid is the safest and best.

*Treatment between Periods.*—Women anemic from hemorrhage must be treated with tonics, protected from fatigue, and placed in the

best general hygienic conditions regarding rest, fresh air, and sleep. Due attention should be paid to the secretions and excretions. The marital relations are to be avoided.

In very severe cases of hemorrhage, where the action of medicines cannot be awaited, immediate resort to mechanical measures is imperative. Rapid dilatation of the cervix and tamponing the uterine cavity with iodoform gauze are usually efficient in these cases. Occasionally, in especially spanemic patients, an oozing hemorrhage will continue through the iodoform-gauze tampon—a thing that is not likely to occur frequently, but when it does is an indication of too loose packing.

Hot vaginal injections oftentimes control hemorrhage. They should be exceedingly hot and their use protracted. The effect of the heat is to produce a stimulation of the vaso-motor constrictor nerve, thus narrowing the blood-vessels contributing to the hemorrhage.

It has been recommended, in cases of profuse menorrhagia occurring in slender, anemic women, to resort to tamponing the vagina at each menstrual period for several consecutive months—a proceeding which does not stop the menstrual flow entirely, but which seems to do away with the excessive loss of blood. Should the amount of blood still be excessive and exhausting in spite of the vaginal tamponing, no hesitation need be entertained in resorting to uterine tamponade. Under this treatment women frequently regain their color, strength, and flesh.

In cases of hemorrhage from lacerated cervix or cancer in the cervix uteri, the use of the persulphate of iron, with iodoform or boracic acid, is an excellent treatment. Where these fail vaginal tampons may be relied upon.

### DYSMENORRHEA.

**DEFINITION.**—Dysmenorrhea means painful menstruation. Normal menstruation is painless. The mild degree of discomfort and uneasiness experienced by many women is not included in this disorder. Many women suffer pain during menstruation upon moving around, but are free from it while lying down. Women experiencing mild suffering only can scarcely be included under the head of dysmenorrhœic patients.

**DESCRIPTION.**—The different manifestations of pain in dysmenorrhea are very numerous. Some women experience pain until the flow is fully established, when all suffering ceases. Others have the

prodromic suffering, which extends through to the second day of the flow. Others have the prodromic pain and that of the first day or two, to be followed by complete relief for a time, when it will again reappear during, for example, the last day of the flow. With some the pain occurs suddenly with the flow, extends through the whole period, and gradually disappears as the flow ceases. Again, other women have painful menstruation every second month, having no pain at the alternate period.

The *seat* of the pain varies in different women. In the vast majority of cases, the pain occurs in the hypogastric region; in other cases it invades both the hypogastric and iliac regions. In still other cases it is circum-pelvic, starting from the lumbo-sacral region. Still other women have the pain located in one iliac region only. In severe cases it extends down one or both legs or up to the waist, or even to the axilla.

In the vast majority of cases of dysmenorrhea the pain is not severe enough to demand the attention of the physician, quietude and domestic remedies sufficing to relieve the suffering. Some cases are so severe as to demand medical interference. In the severest cases the general health is undermined, the nervous system yielding the most urgent manifestations, such as *hysteria gravior*, mania, and even epilepsy. One case came under the writer's observation many years ago, where it was necessary to perform artificial respiration for several hours during the flow. Some cases are so intractable as to defy remedial measures, necessitating the operation of oöphorectomy.

A certain phenomenon occasionally observed has been denominated intermenstrual dysmenorrhea. It is characterized by spasmodic pains in the iliac regions, occurring in the interval between the menstruations. It is only occasionally met with, is rebellious to treatment, and has been so severe as to demand the removal of the ovaries for its abolition.

In one form of dysmenorrhea the pain is slight in the beginning, and progressively increases until it reaches a climax, suddenly terminating in a gush of blood from the vaginal orifice. It is followed by a period of comparative relief from pain, which, in a few minutes or an hour or two, is succeeded by another similar paroxysm of suffering. This variety is seen in many cases of uterine flexions. It has been characterized, perhaps erroneously, as tubal colic.



**VARIETIES AND PATHOLOGY.**—Writers have described many varieties of dysmenorrhea. While the tendency of this sort of teaching, unqualified, may be misleading, it is perhaps best to subdivide the subject into varieties for convenience of description. Above all, it must be borne in mind that dysmenorrhea is always a symptom of some pathological condition which utterly precludes the possibility of routine treatment. Indeed, any attempt to treat all cases alike is the merest charlatanism. The names given to express the different varieties of dysmenorrhea imply the leading pathological conditions. It must be understood that one or two, or even three varieties of causes may be found in the same patient; therefore it is possible for one patient to have one or more varieties of dysmenorrhea, just as any person may have one or two or three different kinds of headaches. It will be seen that the completest examination of each case is absolutely necessary in order to intelligently institute treatment. Like amenorrhea, menorrhagia, and metrorrhagia this condition is merely a symptom, not a disease. The following varieties have been described by authors: 1. Neuralgic; 2. Congestive; 3. Mechanical; 4. Ovarian; 5. Membranous.

1. **NEURALGIC.**—This variety may not be associated necessarily with any disease of the pelvic organs. It manifests itself chiefly in the class of patients of nervous or neuralgic temperament.

**CAUSES.**—Any constitutional condition which tends to develop the neuralgic disposition, as anemia, chlorosis, gout, rheumatism, syphilis, malaria, and the like, will precipitate neuralgic dysmenorrhea. This form of the complaint includes cases from the very lightest to the very gravest variety.

2. **CONGESTIVE.**—During menstruation the pelvic organs are congested. When it is normal no pain exists. When there is a state of chronic inflammation, or distorting and deforming adhesions from pelvic inflammation, the normal congestion becomes an abnormal one, and pain results, constituting what is known as congestive or inflammatory dysmenorrhea. Even in conditions of chronic endometritis the menstrual congestion is sufficient to produce this form of dysmenorrhea. The various forms of tumors, as fibroids and polypi, may also constitute a cause.

This form of the malady is seen most frequently in women who have borne children or have aborted, and in women who began the menstrual life and maintained it for a given length of time without



pain. It is the variety which is nearly always traceable to some disorder of which the patient will give the history.

3. MECHANICAL.—In this class of cases there is some obstruction to the ready outflow of the menstrual fluid. It can come from a great variety of conditions. It may occur from stenosis of the cervical canal, produced by any mechanical cause, as severe inflammation, pressure from tumors in the neck of the uterus, or from excessive use of caustics. It may arise from flexion or version of the uterus. It may spring from an intra-uterine polypus acting as a ball-valve at the internal os, or from a stricture of the vagina, or from an imperforate hymen.

In this variety the commonest characteristic symptom is the paroxysmal pain accompanied by a gush of blood from the genital passage. However, the pain is by no means always paroxysmal.

4. OVARIAN.—In this class of cases a careful examination will almost always discover some enlargement or tenderness of the ovaries, and reveal a condition which is called chronic ovaritis. As chronic ovaritis is never wholly free from some pelvic peritonitis, it is easy to understand how the congestion of the menstrual epoch will produce a great amount of pain both before and during the flow. By careful examination through the conjoined manipulation, one or both ovaries can be detected prolapsed somewhat, and perhaps nearer to the uterus than is normal. They are characterized by their increase in size and by their excessive tenderness. The inaccessibility of these organs to treatment indicates the extremely grave prognosis for such patients.

5. MEMBRANOUS.—Patients of this class shed, with the flow, a membrane which is the *decidua menstrualis*. This membrane, when whole, consists of a sac representing the cast of the triangular cavity of the body of the uterus with its three openings, of the Fallopian tubes and the os uteri. It may come away whole or in the shape of shreds and fibres. Microscopically, it is found to be what might be denominated hypertrophied *decidua menstrualis*. The blood-vessels are easily seen increased in size, capacity, and number; the interglandular substance is greatly increased; there is a great development in the utricular glands, whose mouths are visible even to the naked eye. Pregnancy is excluded by the entire absence of the chorionic villi.

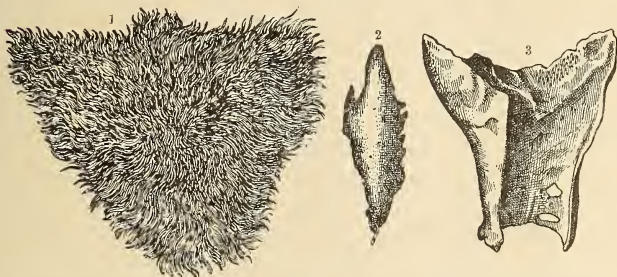
The pathology of the dysmenorrheal membrane has received a vast amount of attention. Many varying theories have been advanced,

maintained, and abandoned. The theory which is, perhaps, the most favored to-day, is that it is an exaggeration of a physiological process with a varying pathogeny. In other words, the membrane is regarded as an exaggerated *decidua menstrualis* of inflammatory origin. It would seem that the therapeutic proof of this theory affords the most convincing argument. Whatever cures the accompanying endometritis in cases of membranous dysmenorrhea is certainly, to-day, its most reliable and satisfactory treatment.

**SYMPTOMS.**—Pain is the one symptom characterizing every variety of dysmenorrhea. A few of its variations are so greatly pathognomonic that observation of them is sufficient for a correct diagnosis.

In the neuralgic variety the undulatory character of the pain is always pathognomonic. In addition to this characteristic of the

FIG. 31.



Membranes of Membranous Dysmenorrhea. 1. Membrane viewed under water; 2. Small piece of membrane; 3. Smooth cast of uterus.

pain, a marked degree of hyperesthesia of the cutaneous surface of the lower abdomen will always be found present. The coexistence of neuralgia in other localities and the identification of Valleix's painful points will facilitate the diagnosis. The pain in this variety shows itself before the flow has been established, and disappears as soon as it comes on, or continues through to the end of the flow, coming and going with no apparent cause. It is in this form of dysmenorrhea that we find the largest number of incoercible cases. The pain may become so agonizing as to make the patient delirious; its severity before, during, and after the flow may be so demoralizing to the physical strength of the patient as to ruin her health

entirely. More cases of destruction of the general health occur in this variety than in all the others combined.

The symptoms of the *congestive variety* are observed chiefly in patients who have previously menstruated painlessly. The pain, coming on suddenly, is very severe in this class of cases, seems to be confined to the pelvis, and is accompanied by a diminution or cessation of the discharge. The constitutional symptoms are always marked: the pulse is increased in frequency, the temperature elevated, the skin hot and dry, and the eyes suffused. There is severe headache, occasional delirium, marked diminution in the renal secretions, and general restlessness. In this variety of the complaint the patient usually experiences pain upon walking, is easily fatigued, has leucorrhea and an irritable bladder, not only at the time of the flow, but during the intermenstrual periods. There is a marked contrast in this class of patients to the women suffering from neuralgic dysmenorrhea. The pelvic malady seems never to leave them between menstruations, whereas women who suffer from a purely neuralgic dysmenorrhea experience trouble chiefly at the time of menstruation. The syndrome of this form of the disease can readily be perceived by bearing in mind the fact that the uterus possesses a pathological congestion, not only between the menstruations, but also throughout all the menstrual flow.

The symptoms of the *mechanical or obstructive form* of dysmenorrhea are peculiar and very characteristic. What has been styled *uterine colic* is the kind of pain most frequently encountered. After the menstruation has continued for several hours, and some blood has accumulated in the fundus uteri sufficiently to distend it, uterine contractions are set up which increase in intensity, until the accumulated blood is forced out of the uterus in a gush. Then the severe pain ceases for a time until the distention from re-accumulation occurs, which is followed by another series of uterine contractions, terminating in the expulsion of the blood. The obstruction to the outflow of the blood may exist in the cervical canal, in the vagina, or the vulva. When the obstruction exists in the cervical canal, the uterine contractions will expel a small clot of blood, followed by a gush, affording complete relief from suffering for the time being. The symptoms are so marked that the diagnosis of this form can be made without any hesitancy, as a rule. The physician must be on his guard, however, not to be deceived by the accumulation of the menstrual fluid in the vagina, and its

periodic expulsion in gushes, according as the patient assumes various positions, or the cul-de-sac becomes filled.

The symptoms of *ovarian dysmenorrhea* are characterized by a period of prodromic suffering extending over several days. The pain is dull in character, confined to one side when originating from one ovary only, extends around the pelvis, over the nates, and down the thighs, and is peculiarly liable to be accompanied by an invasion of the general nervous system and depression of spirits. Painful and tender mammary symptoms often occur in this variety. Inter-menstrual dysmenorrhea is observed more frequently perhaps in this than in any other form of the complaint. Sometimes it occurs on the ninth, sometimes on the fifteenth, sometimes on the twelfth, and sometimes on the seventh day after cessation of the menstruation. Occasionally it is seen only after every second menstruation. A pelvic examination often reveals an enlarged, tender, and prolapsed condition of one or both ovaries. It must not, however, be supposed that in all cases of enlarged and tender or prolapsed ovaries, ovarian dysmenorrhea will be found. Not every case of ovarian dysmenorrhea presents a detectable pathological condition of the ovaries.

In membranous dysmenorrhea the pains usually begin with the flow. After being ushered in they increase as the flow progresses, until the type of veritable labor-pains is reached. During the repetitions of these contractions the os uteri dilates, and the membrane is shed in its entirety or in shreds from the vaginal orifice. Usually the pain ceases at this time; then ensues a moderate menorrhagia, which soon disappears. This is followed by a purulent or sero-purulent discharge, continuing indefinitely from a few days up to the ensuing menstruation. Sterility is the rule in this class of patients, and the women are of an extremely neurotic tendency. The one characteristic of membranous dysmenorrhea is the membrane.

DIAGNOSIS.—The diagnosis of *neuralgic dysmenorrhea* involves the consideration of the entire nervous system. The neuralgic temperament or diathesis is unmistakably present. Valleix's tender points are easily determined. The undulating characteristic of the pain is always present. The pain is not like labor-pains, as in membranous dysmenorrhea, and the suffering is not continuous, as it is in the congestive variety. There are no constitutional disturbances between the menstruations; there are no signs of endo-

metritis, of ovarian or perimetritic disturbances. The pain is habitual, and not paroxysmal. Between the menstruations there are no pains, and no leucorrhea, and the patient appears to be in ordinary good health. In the severer forms invasion of the general health often occurs, presenting, in degrees of varying intensity, neurasthenia, hysteria gravior, delirium, mania, or epilepsy.

In the *congestive variety without* a conspicuous endometritis or general metritis the attack of pain is sudden. There is an absence of constitutional disturbances, and the pain ceases after the flow stops. In the congestive variety *with* a marked uterine inflammation there is always constitutional disturbance, such as rise of pulse and increase of temperature, and the patient is never wholly free from pelvic suffering between the menstruations. This characteristic is in marked contrast to the dysmenorrhea from neuralgic origin.

The diagnosis of the *mechanical* or *obstructive* form of dysmenorrhea is made chiefly from the expulsive and paroxysmal occurrence of the pains. A physical examination is necessary to complete the diagnosis and to discover what is the underlying pelvic condition present. Conjoined manipulation will easily disclose the presence of antelexion. Tumors in the cervix may easily be discovered by the finger. Deflections of the uterine canal can be demonstrated by the use of the sound. Should the obstruction exist in the vagina, it will soon become apparent upon a digital examination. Occasionally it will be found that the only obstruction existing in the uterine canal is an unusual reduplication of the lining membrane of the uterus at the internal os, and a spasmodic constriction of the muscular fibres at the opening.

**Prognosis.**—Dysmenorrhea has usually a favorable prognosis. In the vast majority of cases of the neuralgic variety the prognosis is entirely favorable. Occasionally it will be found that an incoercible case of neuralgic dysmenorrhea will be encountered, wherein all medical treatment will prove utterly unavailing. In such cases there seems, unfortunately, to be but one cure, and that is to induce artificially the change of life by the removal of the ovaries. Where there is one case demanding resort to this operation, there are many thousands that need nothing of the kind.

Of the congestive variety, the prognosis is almost always favorable, the cure of the patient depending upon the success of the treatment instituted for the inflammatory condition present.

The prognosis of cases of mechanical and obstructive dysmen-



orrhœa depends wholly upon the success of the treatment instituted to abolish the obstruction.

In ovarian dysmenorrhœa where organic degeneration of the ovaries exists, the prognosis is favorable only in case of removal of these organs. Where such degeneration is absent, the treatment of ovarian congestion or of ovaritis, when successful, will cure the dysmenorrhœa.

Membranous dysmenorrhœa presents a not very favorable prognosis in the greatest number of cases. Occasionally patients will be seen whose general health is so degenerated that all treatment of this form of the malady proves utterly fruitless.

TREATMENT.—The variety of the dysmenorrhœa always decides the treatment. No case is intelligently treated wherein an attempt at satisfactory diagnosis is not made. In general, it may be said that the routine treatment of any form of dysmenorrhœa by means of the preparations of opium and diffusible stimuli, is to be condemned. There is no question that opiophagists and drunkards have been made by this line of inconsiderate treatment. This assertion may be disputed, and is disputed, by some physicians, but their observations must be considered too limited to be reliable. This general statement may be made concerning the use of these two remedies in dysmenorrhœa: He who is compelled to resort frequently to opium and stimulants, must be considered devoid in diagnostic ability, and consequently ought not to be entrusted with the management of such cases.

*Neuralgic Variety.*—The treatment of this form may be subdivided into general and specific treatment. In the beginning of the treatment the physician must carefully ascertain the general state of the patient. If she be of the rheumatic, gouty, or syphilitic diathesis, this must be met by the usual remedies; in other words, the physician must treat assiduously the systemic condition which seems to predispose to the development of this neuralgia. The daily free administration of laxatives and diuretics is advisable. Should a local cause for the constipation be found in the anus or rectum, it should be removed by surgery or otherwise. Free daily evacuations of the bowels are indispensable to the restoration of the physiological balance of these patients. Constipation may lead to fecal anemia. In women thus affected neuralgic dysmenorrhœa is extremely common. Rheumatism should be treated with colchicum, guaiac, the salicylates, and the preparations of potash. Gout



requires the administration of minute doses of calomel, as one-twentieth of a grain three times a day, and with the citrate of potash or lithia. Syphilis calls for mercury and iodides. An anemia demands tonics. An underlying fermentative dyspepsia, which may be one source of degenerated general health, requires gastric lavations, creasote, glycozone, and other antiseptic remedies.

When the first consideration of the treatment of the patient—namely, constitutional treatment—has been provided for, then attention should be turned to remedies specially addressed to the relief of the suffering. In this class of patients purely antineuralgic remedies oftentimes yield most brilliant results. Phenacetin and antipyrine will relieve a large number of these cases. Many remedies have been recommended to be given a week before the flow comes on, to prevent the pain arising in neuralgic dysmenorrhea. Apiol has been given as a preventive of these pains, five minims in a capsule three times a day for one week before the flow appears. Five drops of the tincture of pulsatilla, in water, three times a day, are similarly recommended. If given for a week beforehand, guaiac or the sodium salicylate will oftentimes prevent an attack of neuralgic dysmenorrhea in women of the rheumatic diathesis. For the treatment of the pain, when it has occurred, auxiliary measures should not be neglected, such as rest and the application of warmth to the skin. The best results are perhaps yielded by ten or twenty grains of antipyrine or phenacetin, repeated hourly, until two or three doses, if necessary, are given. The best effect from these remedies is obtained when the patient lies with closed eyes in a quiet, darkened room for half an hour after taking them. Usually one dose of phenacetin is sufficient; sometimes a second or third dose is necessary. The well-known depressant cardiac action of the remedy can best be anticipated, if necessary, by the administration of twenty or thirty drops of the tincture of digitalis. This remedy, digitalis, is occasionally necessary. Nitro-glycerin and amyl nitrate, given until flushing arises, oftentimes produce excellent results. Six-grain doses of the oxalate of cerium every hour have been recommended. The tincture of cannabis indica, in twenty-five-drop doses every three hours, given even to the production of hallucinations, is oftentimes effective. Chloral hydrate in ten-grain doses, repeated hourly until three or four doses have been given, will often relieve pain. Where the spasmodic element appears to exist,

as will be indicated by a great diminution of the flow, the solanaceæ will be extremely useful. Thus belladonna, hyoscyamus, or stramonium given to the production of mydriasis is often very effective.

A general hot bath, from twenty to thirty minutes, frequently produces great relief.

Occasionally the paroxysms of pain are so terrible that we are justified in using hypodermic injections of morphine and atropia, but they should always be the last resort.

The treatment of the patient, in cases so severe, should be most assiduous and careful, to ascertain if it be not possible to avoid the further use of opium. Very rarely a case of incoercible dysmenorrhea, mentioned above, will resist the treatment—even that of hypodermic injections—when the removal of the ovaries for the artificial induction of the menopause will be imperatively demanded.

*The Congestive Variety.*—Herein the treatment must be directed by the diagnosis of the cause of the congestion. If it be due to the plethora of a retro-displacement of the uterus, the organ must be properly sustained. A wool tampon soaked in glycerin, adjusted with the patient in the genu-pectoral position, will suffice to thrust the fundus forward into its proper place, where the organ can empty itself satisfactorily. If upon examination the uterus is found to be decidedly congested, as shown by the distended condition of the blood-vessels or by the purple appearance of the cervix, leeches or scarification will suffice to relieve. Should the attack be precipitated by catching cold, the use of the saline cathartics, a diuretic, and a diaphoretic will be indicated. When the congestion arises from the pressure of an extraneous growth, either within or without the uterus, the case will be cured only upon the removal of the cause.

*Mechanical or Obstructive.*—The best-recognized treatment of ordinary cases of cervical constriction, whether acquired or congenital, is forcible dilatation. If this be decided upon, the patient should be thoroughly anesthetized, placed in the lithotomy position, the cervix exposed by the use of retractors, seized with the vulsellum forceps and drawn down toward the vaginal orifice. The direction of the uterine canal should be determined by the use of the uterine sound. If the cervical orifice be too small to admit the blades of the Goodell dilator, a narrow dressing forceps can first be passed within the internal os, and its blades sufficiently separated to enable the Goodell dilator to be subsequently introduced.

With the set-screw this dilator can be opened to the extent of an inch or an inch and a half, five or ten minutes being consumed in its accomplishment. If any evidences of endometritis exist, the endometrium should be mildly curetted. Should granulations be brought out, then the curetting must be very thorough and the entire endometrium gone over systematically. It is not necessary to wash out the uterine cavity with an antiseptic liquid, because it can be thoroughly emptied with the curette. The irrigation can, however, do no harm, and should be practised. A narrow piece of iodoform gauze should then be packed into the uterine cavity until it is filled, and allowed to remain for a space of two days. Subsequent pain of uterine contractions can be held in check by the use of moderate doses of opium in some form. This method of relieving mechanical dysmenorrhea is remarkably successful in the majority of cases, but not in all. Direct electrolytic treatment of the cervical canal, in a manner similar to that used in the treatment of the male urethra, has been urged as absolutely certain, in preference to the dilatation measures.

Sponge, laminaria, and tupelo tents have been used a great deal in the past. Progressive gynecologists rarely resort to their use at present, because of the possibility of sepsis following. Forcible dilatation has been found much preferable.

When the constriction does not exist within the cervical canal, it is usually the result of some severe inflammation, as from the use of caustics or from some cervical laceration occurring in labor. In such cases it is necessary to lay open the internal os by cutting with a knife or scissors. In order to keep the os patulous the use of the intra-cervical stem pessary for two or three months generally suffices. When the constriction arises from flexion, the favorite method of treatment is the use of an intra-uterine stem pessary, constantly worn for a year or longer. In married women the use of this stem pessary is often followed by conception. If the gestation go on to term and end in a normal labor, the involution of the uterus is usually followed by a return of the flexion. In this manner it is shown that uterine flexions are oftentimes in reality incurable. To meet this condition the operation for the formation of an artificial os uteri upon the convex side of the cervix has been devised. It consists of the division of the cervix up to the point of the flexion and the turning in of the mucous membrane to form an artificial os uteri. This surgical procedure is of such

recent introduction that the verdict concerning its merits is still held *sub judice*.

When the obstruction arises from an intra-uterine polypus, its removal constitutes the only relief.

Obstruction residing in the vagina must be treated by dilatation either by large bougies, tents, or incision.

Should the obstruction arise from syphilis, constitutional treatment must be conjoined.

Where the obstruction is produced by an imperforate hymen, the only relief consists in its division.

If a fibroid tumor constitutes the cause of obstruction, one of the methods for disposing of this condition must be employed.

*The Ovarian Variety.*—The treatment of this class of cases is perhaps the least satisfactory of all classes of dysmenorrhea. Should pregnancy occur, the nine months of rest secured to the ovaries may become of signal service. However, in such cases sterility is the rule. It is especially in this class of cases that opium and alcohol should be avoided. Remedies to soothe the local irritation and to decougest the pelvic organs are to be resorted to. The use of the wool-glycerin tampon accomplishes this object most effectually of all known means. During the flow complete rest in bed and low diet, and the free use of bromides for a few days before the flow begins, will make many of these patients quite comfortable. Hyoscyamus, cannabis indica, exalgine, and stramonium oftentimes give satisfactory results. Internal medication in this variety of cases is more often unsatisfactory than otherwise.

Where unmistakable evidences of organic ovarian disease exist, the operation for the removal of the ovaries is demanded. Even the removal of the ovaries will at times fail to give the expected relief. Whatever is done to relieve the pain of this variety, short of oöphorectomy, must, as a rule, be repeated monthly.

*Membranous Variety.*—The uncertainty of the pathology of this disorder has led to the most astonishing variety of treatments. Indeed, it can be said that the same uncertainty of treatment exists to-day that existed a quarter of a century ago. The largest number of successful treatments of cases has followed the repeated dilating and curetting of the uterus. Many times these treatments fail; many more times they are successful. Internal treatment for its cure is wellnigh abandoned. A few years ago large doses of iodide of potassium were used; this is now abandoned. All varieties of

constitutional treatment have been tried and abandoned. The consensus of opinion is now centred chiefly upon the treatment by dilatation and curettement, in conjunction with the application of chloride of zinc or carbolic acid, for the purpose of destroying the portion of membrane left behind by the curette.

## STERILITY.

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SYNONYMS.—Barrenness; Infertility; Lat., *Sterilitas matrimonii*; Fr., *Stérilité*; Ger., *Unfruchtbarkeit*.

Sterility in the female implies an inability to bring forth a living child. It involves two points for consideration: first, her inability to conceive at all; and, second, her inability to complete successfully the period of gestation. Many women never conceive at all. Many other women conceive, but are unable to complete the period of gestation.

Women who never conceive are said to be absolutely sterile. Women who have borne one or two children and do not conceive thereafter are said to be relatively sterile. While a woman is nursing her new-born child, as a rule, menstruation does not appear. During this period sterility generally exists, although women occasionally conceive even under these circumstances. This condition may be called physiological sterility. Under this heading is included that form of sterility which exists and is permanent after the woman has passed the change of life.

ETIOLOGY.—Several organs are involved in the process of genesis in the female. The essential element of this process is the ovum, which is supplied by the ovary. The ovum is conveyed from the ovary through the Fallopian tube to the uterus, where it meets the spermatozöon, and genesis follows, provided it has not been impregnated at some point between the ovary and the uterus. The semen reaches the uterus through the vagina. Consequently, the question of sterility involves the investigation of the condition of, first, the ovaries; second, the oviducts; third, the uterus; and, fourth, the vagina. In addition, upon the general condition of the patient alone non-conception often depends. Under this head may be classed the extreme gouty vice, the syphilitic taint, anemia, great obesity, chronic alcoholism, and spasmodic dysmenorrhea.

THE OVARIES.—1. The investigation of the ovaries in sterility includes inquiry into the possibility of the absence, or of the im-



perfect development, of these organs—conditions rarely met with excepting when the other sexual organs are anomalous.

2. Inflammation of the ovaries, chronic or acute, may result in such adhesions of the organs that the ovum is totally prevented from entering the oviducts. It may lead to arrest of function, so that the ovum can no longer be matured. The ovary may become so imbedded in inflammatory deposit that extrusion of the ovum from its capsule is no longer possible.

3. Structural degenerations of the ovary may exist—*e. g.* cystic, carcinomatous, sarcomatous, and interstitial changes—and are generally attended with sterility.

4. Displacement of the ovary, often attended with chronic inflammation, may place it beyond the reach of the fimbriated extremity of the Fallopian tube so completely that the ovum cannot be transmitted to the uterus.

THE FALLOPIAN TUBES.—1. Absence or defective development of the oviducts is usually associated with other abnormalities of the sexual system, and causes hopeless sterility.

2. Inflammation of the oviducts is a cause of sterility. It may affect the serous coat, resulting in such fixation of the tubes as to prevent the *morsus diaboli* from coming in contact with the ovary, or in the formation of constricting bands that occlude the calibre of the tube. It may attack the mucous lining of the canal, and result in the production of secretions which are destructive to the spermatozoa or the ova, or it may result in permanent occlusion of the opening of the tube, whence may follow collections of blood, pus, or serum. In either case the ovum is prevented from descending to the uterus, and sterility follows. Of most importance is the destruction of the epithelia lining the mucous layer of the tube, with their cilia, resulting in the inability of the ovum to pass along the oviduct, either before it has met the spermatozoon or afterward, in the former case the result being sterility; in the latter, ectopic gestation.

3. Degeneration of the tubal structures produces a hopeless occlusion of the canal, and thus causes sterility.

THE UTERUS.—Defective development of the uterus assumes various forms, such as its total absence, its under-size, or its abnormal lateral growth into either a unicornus or a bicornus uterus. *Cónoidal cervix*, with the commonly attendant stenosis of the os, may be classed as one of the variations of defective development. The last-

mentioned condition constitutes one of the most frequently removable causes of sterility.

*Degenerations.*—1. Myomata often cause infecundity, but they are not always a barrier to conception. The coexistence of this degeneration and of pregnancy constitutes one of the most serious conditions encountered by the obstetrician.

2. Sarcomata seem always to prevent pregnancy.

3. Carcinomata, if extensive enough, cause sterility. In their early stage conception is often possible, and is now and then encountered.

*Abnormalities of Involution.*—An excessive involution (hyperinvolution) or a deficient involution (subinvolution) often constitutes a barrier to conception. The writer recently saw a healthy patient, aged twenty-seven, who bore a child at twenty-one years of age, and had not menstruated since that event. The uterus measured but one and one-fourth inches in depth. The organ may still further be decreased in size, even to a quarter of an inch.

Subinvolution of the uterus is often accompanied with an inflammatory state, completely preventing the occurrence of pregnancy.

Inflammation of the uterus or the circumjacent tissues is a very common cause of sterility. The morbid process, according to its seat, may be endocervicitis, endometritis, metritis, or pelvic inflammation. Often two or more of these conditions coexist and render the cure very tedious or impossible. Endometritis may be accompanied by abnormal secretions destructive to the spermatozoa; there may be a dilated uterine cavity; the lining membrane of the uterus may be made so unhealthy that it becomes impossible for a fertilized ovum to secure a lodgment thereon; or the inflammation may cause more or less occlusion of the uterine orifice.

*Displacements.*—Malpositions of the uterus include prolapse, flexions (retroflexion, antelexion), and versions (anteversion, retroversion, and lateroversion).

Anteversion and antelexion exist most frequently in nulliparæ. Retroversion and retroflexion exist most frequently in those who have borne children. Lateral displacements are present when an inflammation has existed in either broad ligament, resulting in its shortening, or when some foreign growth or an inflammatory deposit exists on the side of the pelvis, opposite to the displacement, crowding the uterus away from its normal position.

THE VAGINA.—This organ may be so injured, or may become the

seat of discharges so fatal to the semen, that it becomes a source of sterility.

*Malformations.*—The vagina may be absent congenitally. Its occlusion is very rare, but exists, both as a congenital and an acquired condition. A severe vaginitis has been the cause of an almost total occlusion, by the agglutination of the vaginal walls. The hymen is sometimes so hypertrophied that it becomes a barrier to copulation. Unnatural shortness of the vagina renders it incapable of retaining the semen for a suitable length of time.

*Inflammation.*—Vaginitis nearly always produces discharges fatal to the semen. It is occasionally productive of that condition of spasm called vaginismus, but this is more frequently caused by other conditions.

*Injuries.*—Extensive perineal lacerations often become causes of sterility by shortening and straightening the vagina. *Fistulæ* may also prevent conception.

*Degenerations.*—Elephantiasis labiorum prevents coitus, and thus becomes a barrier to insemination. Extensive urethral caruncle often interferes with successful intercourse.

GENERAL STATE OF THE PATIENT'S HEALTH.—An indefinable something in the patient's general condition is oftentimes the apparent cause of sterility. The proof of this statement consists in the fact that women sterile when in poor health often conceive when their general condition has been improved by remedies, by change of climate, or by travel. Some women are sterile because of the presence of discharges from the genital tract which have their origin in a systemic taint. The lithemic state, for example, may give rise to discharges, which cease when an antilithic course of treatment has been followed, and conception thereafter may follow. Many cases of sterility of this form have been wholly removed by a course of treatment at suitable mineral springs.

Under this head may also be mentioned that variety of sterility which is dependent upon some obscure incompatibility of the parties, illustrations of which every physician of experience has encountered. A woman, sterile in many years of married life, who has been for this reason abandoned by her husband, eventually secures a divorce, is married to a second husband, and bears a number of children. The old illustrations of Augustus and Livia and of Napoleon and Josephine are quoted by writers on sterility.

It is well never to lose sight of the fact that the cause of sterility may be resident in the male, and when no cause can be found resident in the wife, a critical examination of the husband should be made. Not infrequently the physician will be rewarded by the discovery of the defect. It is possible that, in a certain proportion of the cases, when the woman has conceived by a second marriage the defect existed in the first husband.

*Diagnosis.*—It is not always the case that only one of the foregoing obstacles to conception is present. Very often two or more of them coexist. When the causes of sterility are manifold in the same patient, it is obvious that the skill of the gynecologist will often be taxed in recognizing and removing them. A complete diagnosis can be arrived at only by an exhaustive examination. It is always a safe plan for the physician to endeavor to find all of the possible causes of sterility in his patient.

Frequently, after every discoverable obstacle to conception has been corrected, sterility will still exist.

*Prognosis.*—In no condition is the prognosis more uncertain. In a general way it may be stated that imperfect development or marked malformations constitute an absolute bar to conception.

In the same manner, it may be stated that removable obstacles to conception, as inflammations, flexions, versions, stenosis, some vaginal occlusion, or fistulæ, may be treated with a fair prospect of fruitful results. The apparently complete removal of these obstacles, however, only too often fails to render the woman fruitful.

*Treatment.*—A successful treatment of sterility in the female is secured by removal of all the obstacles to conception. Such treatment does not include that of sterility in the male, although many gynecologists investigate the male first, since about one case in ten of infecundity in marriages has its origin in the male. With this branch of the subject, however, the present article has nothing to do.

After the physician has discovered as many obstacles to conception as he can find, he must set about removing them. Insufficient treatment nearly always results in failure. In no department of gynecology is more persistence in treatment demanded.

Urethral caruncles, vulvar vegetations, and other sensitive excrescences must be removed or destroyed.

Vaginal stenosis or contraction must be stretched, and the canal kept patulous.

Cervical stenosis must be overcome by sea-tangle or tupelo tents or by stretching with dilators. Division of the cervix by the hysterotome has been successfully practiced in the past, but is at present falling into disuse, forcible dilatation being preferred.

Uterine deviations must be corrected. Versions can often be rectified by suitable pessaries. It has been suggested that anteversion may be corrected by allowing the bladder to become distended with urine, thus pushing the fundus uteri backward and throwing the cervix sufficiently forward, to place the os in a direct line with the seminal ejection; the entrance of the semen into the cervical canal is thus facilitated. Similarly, retroversion, it is alleged, may be temporarily corrected by allowing the rectum to become distended with feces, whereby the fundus uteri may be crowded forward. It would seem most probable that both these procedures would defeat the desired object. Either one or the other would tend to destroy the natural S-shape of the vagina, producing, in a milder degree, the same condition of straightening of the canal as is produced by laceration of the pelvic floor. Especially in the case of constipation the result would be a tendency to non-retention of the semen in the vagina. The theory of sterility being due to a backward or downward position of the cervix has long been exploded.

Flexions demand the use of the intra-uterine stem pessary.

Hyperinvolution may be treated with the galvanic intra-uterine stem pessary. Similarly, attempts may be made to stimulate the growth of an imperfectly developed uterus.

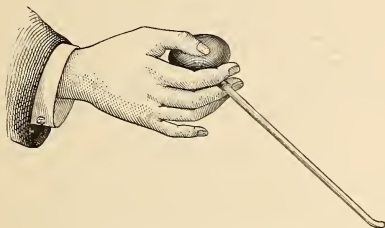
Inflammations must be treated *secundum artem*. Various anti-phlogistic methods of treatment are in vogue. Cauterizing applications, hot-water douches, glycerin tampons, etc., each has its adherents.

Morbid growths on the endometrium must be removed or destroyed.

- Quite exceptionally, the method of introducing semen into the uterus by means of a syringe and tube has been used, it is alleged, successfully.

In the treatment of all cases of sterility the physician must never ignore the general condition of the patient. Systemic vices must be eradicated as far as possible. Many cases of sterility can be cured by general treatment. Repeated abortions indicate the possibility of the syphilitic taint. The existence of this vice in a

FIG. 32.



Apparatus for Artificial Impregnation.

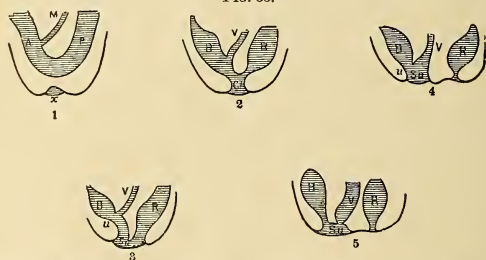
marked degree is an almost certain obstacle to the chances of gestation being completed, and it must therefore receive continuous and persistent treatment for a period of at least two years.



## ANOMALIES OF THE FEMALE GENERATIVE ORGANS.

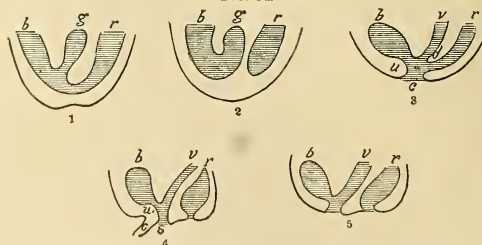
By anomalies of the female generative organs we mean the congenital (not acquired) partial or total absence, the arrest of, or excessive development, or a peculiar formation or malposition of

FIG. 33.



Development of the External Genital Organs—diagrammatic. 1. *P*, rectum, continuous with *Al*, allantois (bladder), and *M*, Müller's canal (vagina); *x*, depression of the integument below the median tubercle, which by its progress inward forms the vulva. 2. The depression has extended inward to become continuous with the rectum and the allantois to form the cloaca, *Cl*. 3. The cloaca has split into the uro-genital sinus, *Su*, and the anus, *u*, by the down growth of the perineal septum. The Müllerian canals are fused to form the vagina, *V*, behind the bladder, *B*, and the orifice of the urethra, *u*. 4. The perineum completely formed. 5. The upper portion of the uro-genital sinus contracts to form the urethra; the lower portion persists and forms the vestibule, *su*, into which both urethra and vagina empty.

FIG. 34.



Malformation of the External Genital Organs—diagrammatic. 1. Complete atresia of the vulva: *r*, rectum; *g*, genital canal; *b*, bladder, communicating with both. 2. Complete atresia of the vulva: *r*, rectum, separated from the allantois; *b*, bladder, and *g*, genital canal, distended with urine. 3. Atresia of vagina and anus: *d*, perineum, incomplete; *b*, bladder; *v*, vagina, and *r*, rectum, open by a common cloaca. 4. Hypospadias in the female: first degree coincident with hypertrophy of the clitoris; *s*, persistent uro-genital sinus, to which succeeds the long vestibular canal; *u*, urethra, and *v*, vagina, opening into the vestibular canal; *c*, hypertrophied clitoris. 5. Hypospadias in the female, properly so-called; the allantois wholly transformed into a bladder, which opens directly, without the intermediate urethra, into the uro-genital sinus—that is, into the vestibule.

any part of the generative tract, considered first, in general, as abnormalities of the external and internal zones; and, secondly, as abnormalities in individual organs, dividing them for consideration into:

1. General anomalies of the two zones: true and apparent hermaphroditism.
2. Anomalies of the separate organs:
  - a. The external zone: the vulva, labia, nymphæ, clitoris, and the vagina; hypospadias and epispadias.
  - b. The internal zone: the uterus, Fallopian tubes, and ovaries.

#### I. GENERAL—TOTAL ABSENCE OF EITHER OR OF BOTH ZONES.

There is on record no authentic case of entire absence of both external and internal generative organs in the same person. Occasionally there have been reported cases of acephalic fetuses, prematurely born, in which no trace of generative organs could be discovered, but these are extremely rare; more than that, no authentic cases have been proven, although many have been described, in which the external genitals have been entirely lacking; in every case properly examined rudimentary processes have been found.

Foville reported a case in which there was absence of the nymphæ, labia, and clitoris, with a fusion of the vestibule; a minute opening only was present, the outlet of the urogenital canals, through which the urine and menstrual fluid passed. In this case Klebs claimed there was fusion of the raphé. Meckel has described some old cases of entire absence of the genitals, but in these cases there was a depression or an elevation where the vulva should have been, and the details of the examinations were so meagre that they cannot be called authentic cases. The complete absence of the internal organs of generation is an extremely rare anomaly, if it exists. Kussmaul describes a female in which the most careful examination showed no signs of uterus, ovaries, or tubes, and where the vagina existed as a minute opening. Emmet records a case where a woman, so called, had been married for two years, but had never menstruated. An examination showed that sexual intercourse had been carried on through the urethra and into the bladder. In this case he was unable to discover any signs of vagina or uterus.

Other writers have described similar cases, but in few of them

has an autopsy been obtained, and then, in each case examined, rudimentary organs have been discovered.

*True Hermaphroditism, in which one or more of the generative organs of the male and female are present in the same individual.*

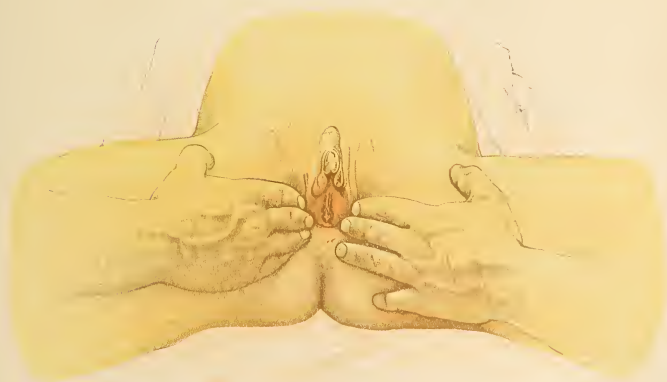
Dohrn denies the existence of true hermaphroditism in the human race, however common it may be in the vegetable and animal kingdoms, while Skene mentions Hildebrandt and Bannon as having authentic cases which they reported. Klebs classified hermaphroditism into—

1. Bilateral, where the ovaries and testicles exist simultaneously on both sides ;
2. Unilateral, where both ovary and testicle are present on one side at least ;
3. Lateral, where the ovary and testicle are present on different sides.

Ahlfeld claims that there has never been on record a proven case of unilateral hermaphroditism, and that he has his doubts about the existence of bilateral hermaphroditism. Zweifel agrees with him in this. Ahlfeld mentions the cases reported by Heppner and Schnell of bilateral hermaphroditism, but there was so much difference of opinion about them that certainly nothing definite was proven. Zweifel quotes the following men as having recorded cases of lateral hermaphroditism: Sue, Barkow, Berthold, Bannon, Meyer, Gruber, and Klotz. Courty divides true hermaphroditism into lateral, transverse, and vertical or double, and says: "Two cases are now recorded—one by Rokitansky and another by Heppner—which prove to a certainty that the simultaneous presence of organs, characteristic of both sexes, may be found in the same individual, not only the one on one side, the other on the other, but simultaneously on the same side." The autopsy in Rokitansky's case in 1869 showed two ovaries with their tubes, a rudimentary uterus, and one testicle, with vas deferens containing spermatozoa. This individual menstruated regularly, and had an imperforated penis and a bifid scrotum. The case of Heppner, the second one he reported, was the autopsy upon a six weeks' infant, in which he found a complete internal generative apparatus, a penis, hypospadias, and two supernumerary glands, which he pronounced to be testicles. Slavjansky declared that these two supernumerary glands were ovaries, and not testicles.

Zweifel says of congenital hermaphroditism: "In not a single

PLATE XII.

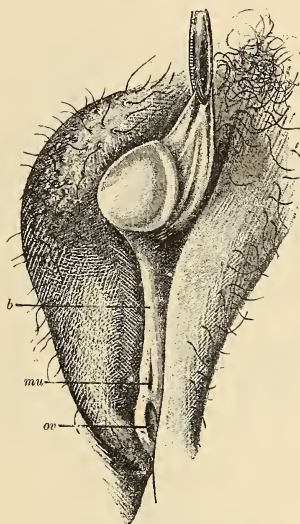


Pseudo-external Bilateral Hermaphroditism.



case as yet, however, have spermatozoa been found in hermaphrodites, the ejaculations consisting simply of such a fluid as even

FIG. 35.



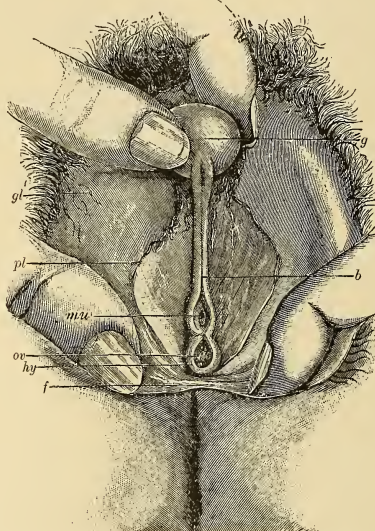
Pseudo-hermaphrodisism proper. External genitals of Julia D—(man). Feminine appearance of the parts with the penis raised and the thighs separated: *b*, frænum; *mu*, meatus; *ov*, vulvar orifice.

females secrete on irritation of their sexual organs." Still, it is certainly a fact that the tendency in the majority of cases is toward the male type, and that nearly all, if not all, authentic cases have been of lateral hermaphrodisism. In apparent or pseudo-hermaphrodisism the female may simulate the male type by an abnormal development of the clitoris and a hernial descent of the ovary into the labia, as described by Auger; or, in cases of hypospadias, the male may resemble the female, the fissure of the corpora cavernosa being taken for a vagina, and the penis, which in these cases is nearly always atrophied, being mistaken for an hypertrophied clitoris. In some of the cases described, the non-descent of the testicles into the scrotum made the diagnosis more difficult. *Vice versâ*, Junie, Coste, Engel, and Huguier describe cases of hypospadias in the female, with hypertrophy of the clitoris, that were regarded and reared



as males. Leopold recorded a case in which a male pseudo-hermaphrodite was married as a female. There existed, in place of the vagina, a cul-de-sac. Oldham cites two cases where herniated ova-

FIG. 36.



Pseudo-hermaphroditism proper. External organs of Louise B.—(man): *g*, glans; *b*, frænum; *ov*, vulvar orifice; *hy*, hymen; *f*, fourchette; *pl*, nymphæ; *gl*, labia majora.

ries in persons who had never menstruated gave rise to a mistake of sex. Ricco and Steglehuer reported cases of the same sort.

## II. ANOMALIES OF THE SEPARATE ORGANS—THE EXTERNAL ZONE; VULVA, LABIA, ETC.

Louis and Petit mention cases of acephalic monsters in which there was complete absence of the vulva. Two cases were described by Riolan in which the left labium majus was lacking. Kussmaul describes Rossi's case, where the vagina existed as a most minute opening, and Foville's case, referred to before, showed an absence of labia, nymphæ, and clitoris. Coste and Seggel have on record cases where the labia were undeveloped, being represented by little ridges of integument.

Meckel, Granville, and Mayer have cited instances where the labia majora have been rudimentary or lacking. There are, of course, many cases on record of a lack of development of the external genitals as a whole, and where the parts, even in adult life, resemble those of an infant. Cases of hyper-enlargement or multiplication of the labia are not so rare. Meissner, Morgagni, Winckel, and Neubauer mention cases where there have been three and fourfold labia and nymphæ. Zweifel quotes Halle as recording a case in which the nymphæ covered the anus. Among certain tribes (the Hottentots, for example) the labia are of enormous size and hang down for six or eight inches (the Hottentot apron).

Arnaud and Morpain describe cases of absence of the clitoris, and Mannosi refers to a case in which an autopsy showed no sign of even a rudimentary clitoris. Zweifel mentions Meissner as quoting unquestionable cases of congenital hypertrophy of the clitoris, reported by Tulpus, DeGraaf, Zachias Avicenna, Plater, Rhodius, and Panarali. Frick, Armand, and Coste report cases of hypertrophy where the clitoris was as large as an erect penis. Ahlfeld describes several cases of this sort in full. The clitoris, like all the other generative organs, may remain in an undeveloped state, and yet, according to some writers, may not be, properly speaking, an anomaly.

Congenital hypospadias and epispadias are not uncommon in the female. In epispadias the clitoris is split at its upper or lower portion, as the case may be. Roser, Schroder, Gosselin, and Testelin have reported cases. Roser's and Schroder's were operated upon and cured by Moricke and Frommel. In hypospadias the posterior wall of the urethra is lacking, the canal opening upward into the vagina. There is seldom a fissure of the clitoris in cases of hypospadias.

*The Hymen.*—Roze, in his interesting thesis, goes fully into the question of the abnormalities of the hymen, and Courty, in his work, discusses the question in full. Illustrations are given of the different anomalies.

Zweifel writes that "very likely, atresia of the hymen is not an anomaly of development," and quotes Briesky as expressing the opinion, that it is simply the secondary obliteration of a previously formed canal, through defective hornification of the superficial epithelium. Briesky in his chapter on congenital malforma-

tion says: "Hymenial atresia, however, is excessively rare as an acquired condition," and he states that he has but once met with a true atresia hymenalis in a new-born girl. The genitals were otherwise normal in this child. He gives an interesting list of eighteen cases of hymenalis and vaginal atresia operated upon and cured by him. Zweifel himself had a case of "atresia hymenalis" where the entire vagina was affected by this epithelial adhesion; so, too, the cases reported of double hymens are simply adhesions of the epithelial cells.

*The Vagina.*—Atresia or absence of the vagina may be partial or total, and, according to Courty, may coexist with absence of the uterus or with a normal uterus. Cook, Yagishita, Mattersdorf, and Barsony have lately recorded cases of congenital vaginal atresia. Atresia of the vagina, to quote Briesky, is probably due to a secondary adhesion, as is atresia of the hymen, rather than to an anomaly of insufficient formation. Bokal and Zweifel seem to agree with him in this theory. Briesky goes on to say that the arrest of development may be of two kinds—cloaca, due to defective division between the rectum and bladder, and the existence of intravaginal septa. The cloaca may be complete or incomplete; the latter may be uro-genital or recto-genital. "The atresia of the upper and middle portion of the vagina is due to the loss of the existing lumen of the divided or united vaginal portions of Müller's ducts," but when the lower vaginal part is wanting, there may be a total absence of the lower part of the Müllerian ducts. Courty describes complete uro-recto-vaginal cloaca in a new-born child, and a recto-vaginal cloaca in a girl of sixteen, who had an imperforate hymen and menstruated through the anus. He cites several other cases of cloaca more or less severe. There may be a transverse division of the vagina, the so-called double hymen, or a longitudinal division, either from right to left—a rare anomaly—or from before backward, the so-called double vagina. These divisions may be complete or incomplete. Puech states that more than one hundred cases of this anomaly have coexisted with anomalies of the uterus, and less than fifteen have been reported with a normal uterus. Great differences exist as to the length and breadth and shortness of normal vaginae; anomalies of excessive length, etc., have been described by Toison, Scanzoni, Courty, Zweifel, and Puech.

*Internal Organs* (the uterus, Fallopian tubes, and ovaries).—  
*The Uterus*.—The division of uterine anomalies is as follows:

- I. *Defectus uteri*. Total absence of the uterus.
- II. *Rudimentarius uteri*. Rudimentary uterus.
- III. *Uterus unicornis*. The one-horned uterus.
- IV. *Uterus bicornis*. The two-horned uterus.
- V. *Uterus septus*. Two-chambered uterus.
- VI. *Uterus duplex or didelphys*. The double uterus.
- VII. *Defectus et rudimentarius cervix uteri*. Defective and rudimentary cervix of the uterus.
- VIII. Abnormalities of position.

Borner gives as the probable ultimate causes of the faults of development in the uterus the following:

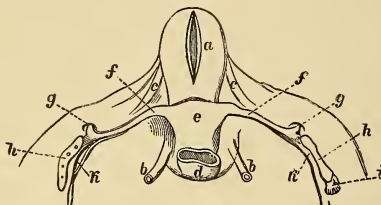
1. Interference with the approximation of union of the two lateral organs which go to form the uterus.
2. Interference with the disappearance of the vaginal septum formed by the union of the median walls, which gives the double-cavity uterus.
3. Nutritive disturbances in the original genital structure.
4. The fact that the obstacle to development may occur so early in fetal life that the foundations of a part of the uterine structure are not laid; in this way a segment on one or both sides may be missing. Hart and Barbour give as the two causes arrested development and arrested growth, which together operate to produce malformations.

I. *Defectus Uteri*.—Kussmaul and Borner claim that the uterus is rarely if ever entirely wanting, and that an autopsy on any case will reveal some vestige of a rudimentary or atrophied organ. Courty quotes a case in which there was claimed a total absence of the internal organs of generation. Borner, Quain, and Steglehuer report cases in which, on the living subjects, they could find no trace of uterus, ovaries, or tubes. In monstrosities in which no uterus was found, no traces of the Müllerian ducts were discovered.

II. *Uterus Rudimentarius*.—Veit, Langenbeck, and Nega have described cases where the uterus seemed little more than a thickening on the posterior vesical wall. Cases have been reported varying from this highest grade of deformity to the approach of the normal. The ovaries in these cases are generally present, and are often normal; there is no trace in the more pronounced cases of any periodic ovulation. Borner, Tauffer, Langenbeck, and Peaslee report cases

where relief was sought for pains and backache occurring regularly each month, but without ever being accompanied by menstruation.

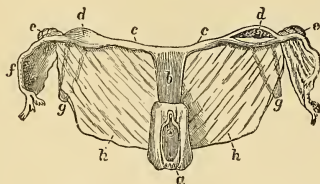
FIG. 37.



Solid Rudimentary Uterus, consisting of one Cervix and two Horns: *a*, bladder cut open; *bb*, ureters; *cc*, umbilical arteries; *d*, rectum; *e*, cervix; *f, f'*, cornua of the uterus; *g, g'*, round ligaments; *h, h'*, ovaries with follicles; *i, i'*, rudiment of the Fallopian tube; *kk*, peritoneal duplicature of the ovaries.

In a case of this sort Leopold operated and removed a rudimentary left uterine cornu and ovary with a perfect recovery.

FIG. 38.



Uterus Bipartitus: *a*, closed vagina; *b*, cervix uteri; *cc*, cornua of the uterus; *dd*, hollow expansion of the cornua; *ee*, atrophied ovaries; *f*, Fallopian tube; *gg*, round ligaments; *hh*, broad ligaments.

FIG. 39.



Infantile Uterus.

III. *Uterus Unicornis*.—An anomaly in which only one horn of the uterus has been developed, the Müllerian duct on the opposite side being atrophied, absent, or undeveloped. In this case the uterus is elongated and lies, obliquely bent, to one or the other side. Pregnancy in these cases occurs naturally, if the vagina be normal, and the shape of the uterus causes the fetus to lie vertically. In a case of Moldenhauer's, on delivery, rupture of the uterine walls occurred. Hegar, Frankenhausen, Borniski, and Borner describe cases where one cornu was atrophied.

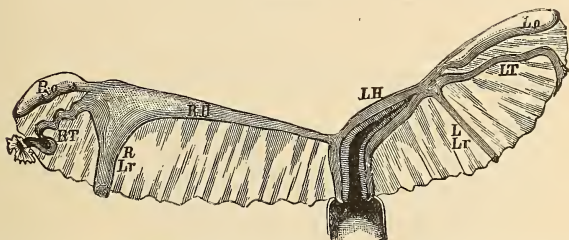
Koerberle performed Cesarean section and removed piecemeal a fetus from a right uterine horn.

Salin, Litzmann, and Sanger performed abdominal sections for



the removal of diagnosed dead fetuses, and found that in each case conception in a uterus unicornis had occurred.

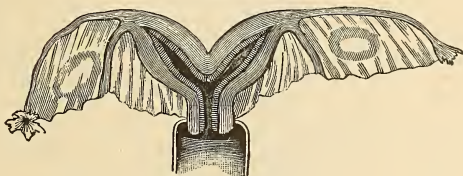
FIG. 40.



Uterus Unicornis with rudimentary cornu: LH, Lo, LT, and L Lr, horn, ovary, tube, and round ligament of the left side; RH, Ro, RT, and R Lr, those of the right side.

IV. *Uterus bicornis* is the result of a non-union of that part of the Müllerian ducts which goes to form the body of the uterus, leaving a division or fissure, more or less pronounced, from before backward over the fundus, separating the cornu, which projects at a more or less obtuse angle, each cornu having its distinct cavity. The

FIG. 41.



Uterus Bicornis.

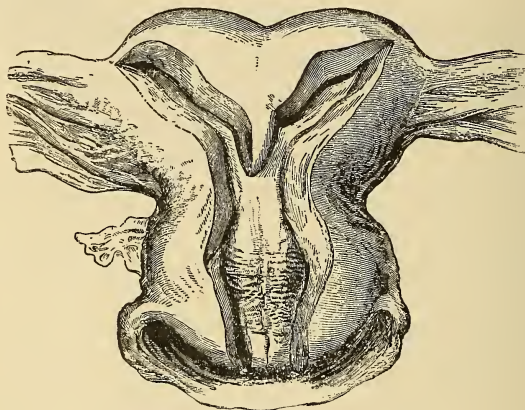
uterus in these cases is often twisted on its long axis, and may contain a partition-wall. Cases have been recorded in which the uterus and the cervix have been divided into two separate compartments. The two horns are seldom equally developed, but the ovaries and tubes are generally normal; the vagina, however, often has the same duplexity. There may be atresia of one of the horns. In cases of extreme separation of the two halves, menstruation does not always occur simultaneously from the two cornu, and in some cases a pregnancy in one half does not interfere with menstruation from the other. Henderson made interesting notes on a case of this kind, watching the woman for sixteen years and delivering her of six



children. In two or three of these pregnancies she menstruated during the whole term.

Gouterman reports a case in which pregnancy occurred in each horn separately and at different times.

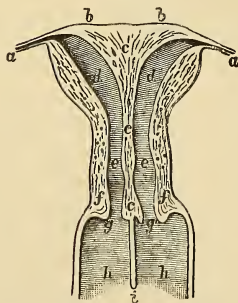
FIG. 42.



Bicorn Unicervical Uterus.

V. *Uterus septus* is a uterus normal in shape and generally in

FIG. 43.



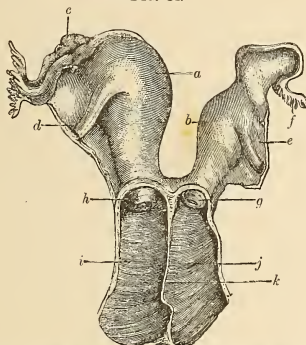
Uterus Septus: *aa*, tubes; *bb*, fundus uteri; *ccc*, septum; *dd*, the cavities of the two uteri; *ee*, internal os; *ff*, external wall of the two cervixes; *gg*, external orifice; *hh*, vagina.

size, but internally divided into two cavities by a partition. This partition may be complete, extending from the external os to the fun-

dus, or may be incomplete and only extend part of the way. In this anomaly the ducts of Müller have coalesced, but the partition-wall has not been absorbed. Blackwood recorded a case in which menstruation occurred alternately from either side. This abnormality interferes very little with pregnancy, but if the placenta is attached to the thin partition-wall, profuse hemorrhage may occur. Ruge recently split the partition-wall in a woman who had miscarried twice, and in the third pregnancy she was delivered at term.

VI. *Uterus duplex* or *Didelphys* is the development of two complete and independent uteri, with no partition-wall and no adhesions. Mayrhofer claims that this anomaly can only occur with

FIG. 44.



Didelphic Uterus and Divided Vagina: *a*, right segment; *b*, left segment; *c*, *d*, right ovary and round ligament; *f*, *e*, left ovary and round ligament; *g*, *j*, left cervix and vagina; *k*, vaginal septum; *h*, *i*, right cervix and vagina.

changes that would render life impossible, and so thinks that cases reported as duplex are only cases of septus.

In Olliver's interesting case the autopsy showed two distinct uteri, separated from each other by folds of the intestines; and Olliver quotes Bonnet as having had the same sort of a case. Heitzmann's case was similar to this, with the additional fact that not only the bodies of the two uteri, but also the two cervices, were widely separated. In all these cases there was but one set of appendages to each uterus, and but one broad and lateral ligament.

Winckel and Cassau have reported similar cases, and Schroder one in which the rectum was between the two uteri. Menstruation has been in these cases normal. Satschowa reports a case where both cavities were gravid at the same time.

VII. *Abnormalities of the cervix uteri* are common both in the size and shape of the canal and the external os, and in the size and shape of the cervix itself. These are well described by Courty in his work on the uterus, ovaries, and tubes. Winckel and Heitzmann have recorded cases of a double os uteri, or a normal uterus and cervix with the external os divided into two parts by an unabsorbed partition. Borner describes a case of his own of complication of the cervical cavity, which appeared at first sight like a cervix within a cervix, and quotes a case of Breisky's at Berne which was of the same kind. Borner was the first to describe this anomaly, and considers it extremely rare.

VIII. *Abnormality of position* is caused probably by the insufficient development of one of the Müllerian ducts, although united to its opposite duct; again, there may be a difference in the position of the two Müller's ducts, one being lower than the other, so that the fundus when developed is bent to the right or left as the case may be, or even twisted upon itself.

Kussmaul found this malposition in an autopsy upon a child, and in his case, one of the lateral ligaments was abnormally short. Fetal inflammations may play their part in these abnormalities. Sterility generally is present in these cases.

*The Abnormalities of the Fallopian Tubes.*—The entire absence of the Fallopian tubes rarely occurs, Courty says, even when the uterus is entirely absent. In cases of uterus unicornis, both the tube and ovary are lacking on the undeveloped side. Winckel, in post-mortem examination of 500 female bodies, found the tubes to be of unequal length in 25; in 3 cases the tubes were from  $4\frac{1}{2}$  to 5 inches long; and in 2 cases he found accessory tubal ostia. Klob and Rokitsky have called attention to the differences in form of the ends of the tubes, and described supplementary openings that sometimes occur at or near the ends. Hennig described three cases of accessory tubes, and Bandl reported a case in which the tube was normally developed, but imperforated. Congenital abnormalities of position and development of the uterus naturally give rise to abnormalities of position of the tubes, and congenital hernias of the ovaries carry the tubes with them as a rule. Olshausen says: "In some, the Fallopian tube is defective, and its internal extremity is alone developed; its abdominal extremity is destitute of fimbria and obliterated." Keppler describes a supernumerary tube with a corresponding third ovary, that occurred in one of his cases.

*Ovarian Anomalies.*—Congenital absence of both ovaries, like absence of both tubes, probably occurs only in non-viable monstrosities, according to Olshausen, and reported cases in individuals cannot be considered authentic, since torsion and constriction may cause such marked atrophy as to leave little, if any, vestiges of the once-present ovary. Rokitansky demonstrated this condition in several of his cases. Absence of one ovary occurs only in cases of uterus unicornis. Grohe first reported a case of supernumerary ovary, and mentions a second case described by Klebs where the constriction of a band cut the ovary into two halves, each containing Graafian follicles in a rudimentary state.

Sinety's autopsy on a new-born babe showed six appendages to one of the ovaries: one of these appendages showed normal ovarian structure, while the rest were cystic.

Keppler, as mentioned before, found a third ovary and tube in one of his cases. Kochs, Lumniczer, and Winckel describe similar cases. Beigel found appendages to normal ovaries containing ovarian tissue 8 times in 350 post-mortems, and Winckel 18 times in 500 autopsies. Waldeyer found 6 in one ovary. These extra ovaries are generally bilateral; their peculiar feature is their imperfect development. Klebs declares that ovaries, in which germinal epithelium projects into the stroma, with separation of these tubes from the surface epithelium, without the development of follicles and ova, are similar in many ways and in appearance to testicles.

## GENITAL TUBERCULOSIS.

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GENITAL TUBERCULOSIS in the female may exist as a primary affection, although in the great majority of cases it is secondary to tubercular disease elsewhere. As a primary affection it has been found in from 5 to 15 per cent. of cases. J. Whitbridge Williams collected statistics showing genital tuberculosis in from 1 to 8½ per cent. of autopsies on phthisical women, and in 1 of every 12 abdominal sections for inflammatory disease. Cohabitation with one affected with tuberculosis of the genital, urinal, or intestinal tract may be the cause. Inoculation may occur by means of an instrument, finger, clothing, or other foreign body contaminated with the germs. It seems possible that the tubercle bacilli may enter the blood and obtain their first foothold in the diseased genital organs.

As a secondary affection genital tuberculosis may be caused by excursions of the germs from distant parts, through the blood- or lymph-channels; by direct extension, as from the peritoneum, intestines, or urinary organs; or by auto-inoculation through the infected urinary, alvine, pulmonary, or other excretions and discharges.

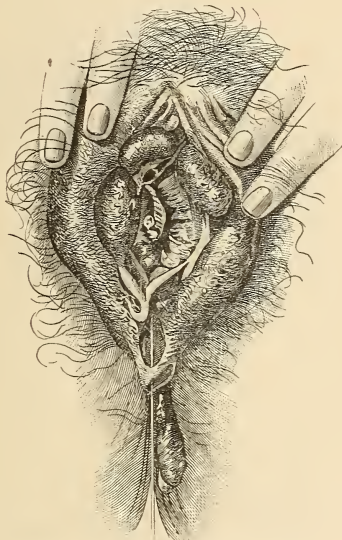
### TUBERCULOSIS OF THE VULVA.

Primary tuberculosis of the vulva is almost necessarily a skin affection, and occurs only in the form of lupus, unless we except those cases of coincident vaginal and vulval ulceration observed by Deschamps, Chiari, and Zweigenbaum. In these cases the disease was probably of vaginal origin, and not a true tuberculosis of the vulva.

*Lupus* begins on the cutaneous portions of the vulva in the form of hard masses, of a dark-red, livid color, imbedded in indurated skin. Sometimes there will be one large mass, sometimes a more diffused infiltration with several masses. On the dull-red or yellowish-brown surface or surfaces, brighter red, projecting tubercles appear,

which in a few weeks or months commence to ulcerate and exude a serous fluid. When there is but a single mass, the whole surface assumes the appearance of a raised, unhealthy ulcer, while, in the diffuse variety, the ulcers may be separated. The base is hard and does not usually bleed easily, and is composed of friable, unhealthy-

FIG. 45.



Lupus hypertrophicus et perforans of the Vulva.

looking granulation-tissue. As the disease spreads it takes in more and more of the skin, and finally invades the lymphatic glands and internal organs. The course is usually slow, extending over years, and in old cases is often accompanied by cicatricial contraction in places, thus producing more or less deformity. The general health does not, at first, suffer, but the disease, after lasting several years, usually ends fatally.

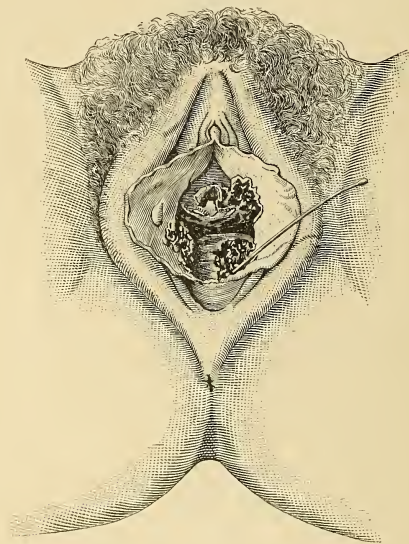
The **DIAGNOSIS** presents no real difficulty, for its slow development and chronicity distinguish it from cancer and malignant disease, while the ulcerative characteristics differentiate it from elephantiasis.

The **TREATMENT** should always be radical. When possible, the



diseased parts should be extirpated. When not, a thorough curetting with a sharp instrument, followed by a disinfection of the wound with strong acid, may be tried and repeated as often as the disease returns. Free incisions or linear scarifications favor cicatrization and healing. Deep cauterization by means of electro-puncture is

FIG. 46.



Lupus of the Vulva.

the most satisfactory way of treating many cases, for all parts of the diseased tissue can thus be reached and cicatrization secured. The treatment must be repeated as fast as the disease recurs or redevelops, until all foci are finally destroyed.

#### TUBERCULOSIS OF THE VAGINA.

Tuberculosis of the vagina is usually secondary, although a few cases have been observed in which no other foci of the disease could be discovered.

It commences in the form of miliary tubercles, which in time break down and form irregular, flat ulcers with sharply-defined edges and a depressed grayish or yellowish-gray base, studded with

granulations and covered by caseous matter. An area of hyperemia more or less filled with miliary tubercles usually surrounds the ulcer.

Tubercular fistula may result either from the vaginal ulceration extending into the connective tissue, and thence into the rectum, bladder or perineum, or from perforating rectal or vesical ulcers. We have been able to trace one fistula to ulceration of the Fallopian tube into the connective tissue and out at the skin over the perineum.

The usual seat of vaginal tuberculosis is in the posterior fornix, which probably becomes infected by the uterine secretions. It has been found that peritoneal or tubal tuberculosis may, either of them, infect the vagina without infecting the intervening structures, although in the majority of cases the uterus also becomes infected.

A case of secondary infection from the umbilicus has been reported.

When the poison is introduced from without, the lower portion of the vagina may become first attacked.

The vaginal epithelium resists the invasion of tubercle bacilli until it becomes injured or abraded by trauma or the presence of irritating fluids or secretions.

The character of the ulceration and the fact that miliary tubercles in the vaginal walls are almost invariably connected with tuberculosis elsewhere, will prevent them becoming mistaken for granular vaginitis. Chancres may be mistaken for tuberculous ulceration of the vagina, but the clinical history and course of the disease soon clear up all doubt. A microscopic examination may sometimes be required to differentiate between it and carcinoma.

The TREATMENT should be as radical as possible when the vagina alone is affected. Excision of the diseased part and cautery of the wound should be done whenever practicable; otherwise, curetting and cautery. When, however, as is usually the case, the uterus and Fallopian tubes are affected and radical measures give no hope of prolonging life, palliative treatment only will be indicated, such as astringent and antiseptic vaginal douches, local applications to improve the character of the ulcerations, incisions, and cleaning of fistulæ, general tonics, etc.

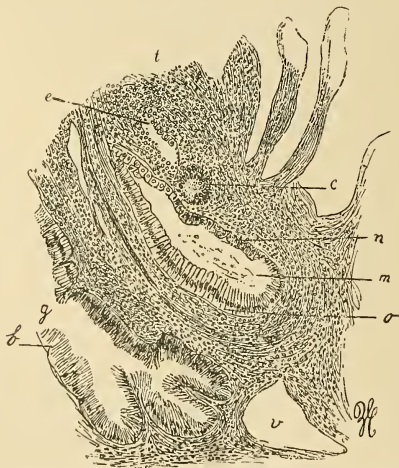
#### TUBERCULOSIS OF THE CERVIX UTERI.

But few cases of tuberculosis of the cervix alone have been observed. The cases are also rare in which the body of the uterus is

at the same time affected, the majority of cases being found in connection with tuberculosis of the vagina.

It occurs in the form of miliary tubercles, ulceration, or a combination of both. It is supposed that the mucous membrane of the cervical cavity, which does not have the protecting pavement epithelium of the vaginal portion and vagina, can become infected without having a previous lesion. The first stage is one of catarrhal inflammation, with the presence of small tubercles under the mucous membrane, usually too small for recognition clinically. As the disease advances the cervix enlarges, and ulceration similar to that of the vagina may appear. Small-celled infiltration of the connective tissue with the characteristic giant-cells, secondary villousities on the folds of the arbor vitæ, and enlarged glandular cavities are found.

FIG. 47.



Tuberculosis of the Cervix Uteri: *g*, papillae and superficial vegetation; *t*, connective tissue containing many round cells; *e*, fissure in tuberculous tissue, in which may be seen epithelioid cells belonging to a tubercular follicle; *c*, giant-cells; *n*, epithelial covering of a gland near a tubercular follicle, showing large epithelial cells; *o*, epithelial layer formed of elongated cells; *m*, mucus contained in the gland; *b*, greatly elongated epithelial cells of a gland; *v*, vessel.

In case of development upon the vaginal portion, the granulations are for a time covered by normal layers of epithelium, the disease develops in the submucous connective tissue, and even extends slightly into the muscular layer.

The **DIAGNOSIS** is based upon the presence of tuberculosis elsewhere, the severe grade of the cervical endometritis, the infiltration of the cervix, the characteristic ulcerations (similar to those on the vagina), grumous discharge, and the microscopic examination of the secretions and tissue, with or without the discovery of the tubercle bacilli. Tubercle bacilli are not always found in the secretions, but the nature of the infection can be proven by inoculation into the peritoneal cavity of a guinea-pig.

The **TREATMENT**, in the beginning, calls for a high amputation of the cervix—after extensive infiltration, for a vaginal hysterectomy, provided, of course, other of the genital organs are not also affected. When extirpation is no longer possible, palliative treatment, such as recommended above for vaginal tuberculosis, must be depended upon.

#### TUBERCULOSIS OF THE UTERUS.

Tuberculosis of the uterus seldom occurs except in connection with tuberculosis of other parts. It is, however, not a rare complication of general tuberculosis, and is frequently found in connection with tuberculous disease of the Fallopian tubes. It has been found in about two-thirds of all cases of genital tuberculosis. Like cancer of the uterus, it seldom extends below the internal os. The puerperal state predisposes to its development.

Three forms are given: 1, miliary tuberculosis, with or without the formation of ulcerations; 2, chronic diffuse tuberculosis (caseous endometritis); 3, chronic fibroid tuberculosis. As, however, the first variety occurs only as a manifestation of general tuberculosis or as the initial stage of diffuse tuberculosis of the uterus, without any definite clinical history separate from the general infection, and, as the third variety has not been recognized, except on the post-mortem table, we will limit ourselves to the consideration of chronic tuberculosis or caseous endometritis.

This form commences as a deposit or deposits of miliary tubercles in the mucous membrane just underneath the epithelium, with areas of inflammation over them. Microscopic examination of these areas shows a development of giant-cells, often containing bacilli. As the disease develops the epithelium is destroyed, and ulcers are formed with a caseous or necrotic base and surrounding infiltration of leucocytes. In time those areas increase and unite, and the entire endometrium as far as, but not beyond, the internal os

becomes the seat of caseous inflammation. The mucous membrane is infiltrated with small cells and destroyed, so as to be represented by a yellowish, caseous coating covering an ulcerated surface, studded with typical tuberculous nodules. The muscular tissue becomes hypertrophied, and at last so extensively infiltrated as to destroy the firmness and resisting power of the uterine walls. When accompanied with stenosis of the cervical canal pyometra may result.

The SYMPTOMS are, first, those of ordinary endometritis, with more or less thickening of the uterine walls. The discharge, as the disease advances, contains cheesy matter that can often be recognized by the naked eye. The disease is chronic, and often associated with the symptoms of general tuberculosis.

The DIAGNOSIS in the beginning may be difficult. The symptoms of chronic endometritis with a grumous discharge, thickened and enlarged uterus, salpingitis, and perhaps chronic peritonitis, should lead us to suspect the disease. The discovery of tubercles in any part of the system adds to the probability.

A positive diagnosis, however, is usually made, only by a microscopical examination of the discharge or of the *débris* obtained by curetting. Tubercle bacilli should be sought for, but cannot always be found. Inoculation into the peritoneal cavity of guinea-pigs should give results inside of two weeks. Sterilized glycerin jelly may be infected by the mucus.

According to Paul Petit, the following characteristics, discovered in the scrapings of the uterine cavity, prove the existence of tuberculosis: "Interstitial cells which are necrosed or atrophied in a diffuse manner or in well-defined lines; giant-cells in greater or lesser embryonal nodules, detached from the stroma, and apparently developed around the vessels, whose lumina may or may not be preserved; numerous flexible and dilated glands lined with epithelial cells, which are either readily elongated or have undergone an epithelioid transformation."

TREATMENT.—If the uterus alone be affected, it should be removed through the vagina. If the tubes are affected, they may be removed by an abdominal section, and the uterine body amputated at the cervix at the same time. To remove adherent tuberculous appendages and the entire uterus from above would be a difficult operation in most instances. There are undoubtedly cases in which both the



uterus and the tuberculous appendages can best be removed by vaginal section. Further experience will enlighten us on this subject.

#### TUBERCULOSIS OF THE FALLOPIAN TUBES.

In the great majority of cases genital tuberculosis commences in the Fallopian tubes near or at their fimbriated extremity. In nearly all advanced cases the uterus, ovaries, or peritoneum, one or all, are likewise affected. Tuberculosis of the Fallopian tubes may be primary, but it is, as a rule, secondary to peritoneal, intestinal, or a part of general tuberculosis. The frequency of this affection has only recently been brought to the attention of the profession, and many cases of salpingitis and pyosalpinx turned out to be of tuberculous origin. The trouble, when better known, may prove to be quite a common one.

**PATHOLOGICAL ANATOMY.**—Tubal tuberculosis begins by the deposit, over a limited area or areas, of miliary tubercles immediately underneath the epithelium. At first these tubercles are not recognized by ordinary inspection, and often pass unnoticed when tubes thus affected are removed. As there are no symptoms of this stage other than those of the catarrhal inflammation, the condition is of greater scientific than practical interest.

Tuberculous salpingitis or chronic diffuse tuberculosis of the tube is the form usually diagnosed. In these cases the tubercles may or may not spread over the entire mucous membrane of the tube. The overlying epithelium is destroyed, and the mucous membrane about the tubercles is infiltrated with epithelial cells, more extensively near the fimbriated end, where the tubercles are most abundant. Coagulation-necrosis takes place in spots, and may involve the whole mucous membrane in the destructive process, so that the membrane may be represented, particularly at the fimbriated end, by a mass of caseous material, lying over granular ragged ulcers or directly upon the muscular structure. The disease develops slowly, and remains for a long time limited to the mucous membrane, but in time invades the muscular wall, causing hypertrophy and sometimes nodular thickening of the walls of the isthmus. The fimbriated end is apt to be closed, and the secretions have the appearance of a curdy pus, consisting of mucus, cheesy matter, with granular and epithelial débris, and, if there be mixed infection, also of pus. In old cases the pus-corpuscles may entirely be converted into granular matter, so that neither pus nor pus-germs can be discovered. As much as two quarts of puriform



matter have been found in the dilated tube, but ordinarily the quantity is small, and may consist of only a little grumous fluid or of almost solid cheesy matter, which may be partly calcified. The tubal walls are thickened, and become attached by dense adhesions to the posterior surface of the broad ligaments, pelvic walls, omentum, and

FIG. 48.



Tubercular Pyosalpinx with Tubercular Ovary.

intestines. The adhesions and tuberculous deposits usually affect the ovary and surrounding peritoneum.

The ordinary microscopic appearances of tuberculous tissue with inflammatory action, are usually present. In the folds of the mucous membrane are found giant-cells surrounded by round-cell infiltration, tuberculous follicles, degenerating cells, etc. Tubercle bacilli cannot always be detected. Williams describes a chronic fibroid tuberculosis of the tube. He says: "It differs from the other forms of tuberculosis in the excessive formation of fibrous tissue

in and between the tubercles. Sections show the lumen greatly distorted and a few miliary tubercles scattered through the mucosa. There may or may not be accompanying inflammatory changes, the main change consisting in the excessive development of fibrous tissue both within and without the tubercles and the relative absence of caseation. The marked feature of this form of tuberculosis appears to be its chronicity."

**SYMPTOMS AND DIAGNOSIS.**—The symptoms are those of ordinary salpingitis, but with a somewhat different clinical history. We would suspect a salpingitis with extensive adhesions, afternoon temperature, and signs of progressive chronic peritonitis, in a delicate virgin, to be tuberculous. A tuberculous family history, or the discovery of the disease in the peritoneum or in any other part of the system, and the absence of any other apparent cause or known beginning of the disease, arouses suspicion of its tuberculous character. Encysted ascitic fluid extending high above the pubes indicates tuberculosis in the majority of cases. The ovaries are often coincidently affected, and give the usual signs and symptoms of chronic ovaritis. A salpingitis in an ordinary healthy woman with symptoms of pelvic inflammation dating from marriage, an abortion or confinement, with occasional acute attacks of pelvic peritonitis which subside so as to leave no temperature, which recur as the result of over-exertion or trauma, and which are retrogressive rather than progressive as long as the patient remains quiet, would be considered due to other causes than tuberculosis. In the later stages the lymphatic glands of the pelvis may be enlarged.

**PROGNOSIS.**—The prognosis is similar to the prognosis of tuberculosis elsewhere. There is always a tendency to spread to the peritoneum, ovary, and uterus, and finally to a general infection and a fatal termination. Recovery from primary infection through fibrosis may, however, take place.

**TREATMENT.**—In cases of primary tuberculosis of the tubes they should be removed. When the disease is associated with tuberculosis elsewhere, except in the ovary and peritoneum, the operation should only be performed in case the complicating conditions are quiescent and the general condition of the patient good. Tuberculosis of the peritoneum, except in an advanced stage, is not a contraindication, since abdominal section often has a beneficial influence upon it.

## TUBERCULOSIS OF THE OVARY.

Primary tuberculosis of the ovary has not yet been described. In connection with tuberculosis of the Fallopian tubes and of the peritoneum it occurs frequently, more often with the former, but has been found in a few instances as a part of general infection, without participation of the other organs of generation.

It occurs in the form of miliary tubercles, caseous masses, or tuberculous abscesses. The miliary tubercles have usually been found on the surface of the ovary, and in connection with tubercular peritonitis, have been known to invade the walls of ovarian tumors. Adhesions are not usually present, except in the later stages, unless there be tubal tuberculosis.

The symptoms, diagnosis, prognosis, and treatment are inseparable from the tubal and peritoneal diseases with which they are associated.

## TUBERCULOSIS OF THE PERITONEUM.

Tuberculosis of the peritoneum is met with in three varieties, namely :

1. *Miliary*;
2. *Fibroid*;
3. *Caseous*.

The pathology is similar to that of pulmonary tuberculosis; in fact, tuberculosis of the pleura is frequently associated with that of the peritoneum.

The infection may come directly from the blood or from infected viscera by way of the lymph-channels. Tuberculous ulceration of the bowels is undoubtedly a frequent cause. Tuberculosis of the Fallopian tube is found in more than one-third of the cases among women, and may be either the cause or the result.

*Miliary Tuberculosis.*

Miliary tuberculosis of the peritoneum may exist in a latent or an acute form. It may develop in a gradual, subacute manner without active symptoms or with none at all, and go on to the development of fibroid tuberculosis, and not be discovered until the peritoneal cavity is opened, on account of some other disease, either during life or post-mortem.

Acute miliary tuberculosis consists in a development of miliary

tubercles in the layers of the peritoneum, with coexistent peritonitis. The peritoneum about the deposits may be slightly injected or of a raw-beef-red color, with loss of the normal lustre. The tubercles may be confined to the intestinal coils and mesentery or may be found upon the parietal layer and omentum. Ascites of a deep yellow or bloody tinge, without adhesions, may be present, or adhesions may form and either limit or encapsulate the fluid. A fibrinous exudate is formed on the viscera after a time. The intestinal coils may become adherent to one another or to the parietal peritoneum. The omentum may be adherent to the abdominal walls, or to the intestines, or to both. The adhesions are usually frail and bleed freely upon being separated, although the bleeding, which is capillary, soon stops. On account of the tendency to effusion the adhesions are not usually extensive. Tubercles may be found on some of the organs, such as the liver, spleen, or Fallopian tube.

**SYMPTOMS.**—The symptoms may develop suddenly or gradually. In the former case the patient enjoys pretty good health until overtaken by an attack of acute peritonitis. Prodroma, such as loss of appetite, disordered digestion, loss of flesh and strength, elevated afternoon and subnormal morning temperature, occasional abdominal pains, and perhaps tympanites, may not have been sufficient to attract attention.

Upon the supervention of the acute attack, the temperature goes up to 102° or 103° F. in the afternoon, usually with morning remissions, vomiting, and sometimes diarrhea, acute abdominal pains and tenderness, and tympanites. The symptoms usually subside in a few days, but not completely; some intestinal or gastric disorder, some afternoon temperature, some tenderness, and sometimes a little ascites, remain. Pleuritic pains with accelerated respiration may complicate the symptoms.

Usually this condition of partial cure remains for a while, and may be followed by a more or less complete recovery so far as the symptoms are concerned, or by other attacks, with development of the symptoms of caseous peritonitis, persistent gastric and intestinal disturbance, emaciation, and the usual general symptoms of advanced stages of tuberculosis.

In case the disease develops gradually, tympanites, abdominal pains and tenderness, afternoon elevation of temperature, indigestion, attacks of diarrhea, emaciation and weakness gradually become more pronounced and more persistent. The abdomen may

be greatly distended and everywhere resonant, or may show evidences of ascites. These symptoms may at any time develop into an acute attack of general peritonitis, or gradually merge into the caseous variety, or exhaust the patient in the subacute stage.

Special symptoms are often observed that have reference to infection of the affected viscera. Thus we may have slight icterus, hepatic pain, and predominant gastric disturbance when the liver is affected; pain in the iliac regions, backache, leucorrhea, metrostaxis, hysteria, etc. when the sexual organs are invaded.

Pigmentation of the skin has been observed in many cases, particularly in those of slow development and in the caseous variety, and is considered of diagnostic value.

**DIAGNOSIS.**—The diagnosis is based upon the prodroma or the gradual onset of the local symptoms, the general emaciation, and the presence of tuberculosis elsewhere in the system, particularly in the Fallopian tubes, pleura or lungs, and upon the presence, later, of ascites. The ascites is very prone to take on the appearance to the naked eye of an ovarian cyst; in other words, the bulging in the flanks, that occurs in other varieties of ascites, is oftentimes entirely absent, but in its place the abdomen is distended into a globular shape, as in cystic disease. This is of considerable practical value from a diagnostic point of view.

**PROGNOSIS.**—The prognosis of miliary peritoneal tuberculosis is probably more favorable than that of any other form. Many patients get well under good hygienic surroundings and appropriate treatment, while others are apparently cured by an operation.

**TREATMENT.**—The general treatment is similar to the treatment of tuberculosis elsewhere. Tonics, remedies for the relief of gastrointestinal irritation, rest, massage, a carefully-regulated diet, digestives, creasote, counter-irritants, often lead to a cure of the peritonitis, and a practical cure of the tuberculosis through fibroid degeneration.

When ascites has resulted, or when miliary tuberculosis exists without extensive adhesions, an abdominal incision, with evacuation of the fluid if present, and the admission of air into the peritoneal cavity, are often followed by a cure.

Whether light and the dryness attending the removal of the fluid cause the improvement, or the removal of the ptomaines of the bacilli with the ascites, or the subsidence of the inflammation

which favors the development of the germs, or the mere evacuation of the fluid with its embarrassing action upon the peritoneum and intestinal muscularis, is difficult to determine. We should say that the removal of the fluid would be one factor in those cases in which ascites is present. This undoubtedly relieves mechanical embarrassment, removes some irritant products, and leaves the peritoneal absorbents in a better condition to remove the products of inflammation, and thus favors fibroid changes. The admission of air would also act as a stimulant to the circulation. The well-known fact that the bacteria of putrefaction are antagonistic to the development of the tubercle bacillus may also have something to do with its curative action. It must be remembered that many of the cases would have recovered without the operation, and also that the care after abdominal sections must do much to relieve the peritoneal irritation and inflammation. Probably many of the cures reported are instances of temporary improvement.

The question of drainage after such an operation is an open one. If there be but little ascites and no adhesions have been separated, drainage can hardly be of use. Considerable ascites of rapid formation or oozing from separated adhesions would, on the contrary, require it.

In long-standing cases, with fibrinous flakes and some gelatinous fluid that may have been encapsuled about diseased organs, the peritoneal cavity should be douched out with a normal saline solution (0.6 per cent.). This condition, however, belongs more often to the caseous variety.

### *Fibroid Tuberculosis.*

As miliary tuberculosis represents the first stage, so fibroid tuberculosis represents the last stage, of the disease. We refer, of course, to those cases which do not terminate in caseation and ulceration, and which will be considered hereafter.

The condition usually found is that of old, firm visceral and parietal adhesions and fibrous bands of greater or less extent, with hard nodules, sometimes whitish, but more often pigmented, from 1 to 3 mm. in diameter, and situated either on the surface of the peritoneum, in the mesentery, omentum, or in the fibrous bands. Although tubercle bacilli may be found in them, there is a scarcity of tubercle cellular tissue and an abundance of fibrous tissue. The matting together of intestines, omentum, and other viscera may



give rise to localized resistant masses that can be felt through the abdominal walls.

**SYMPTOMS.**—Oftentimes there are no symptoms except those referable to a previous stage, and these may have been overlooked or misinterpreted.

The usual symptoms are, more or less abdominal distension and tenderness, constipation, gastric or intestinal indigestion, emaciation, localized pains, and evidences of present or past tuberculosis in the lungs, pelvic organs, or elsewhere. The tenderness is not so great but that a careful palpation of the abdomen may be made. The temperature may be subnormal for weeks at a time, or, if there be much disturbance in the abdomen, may rise to 100° or even 102° F. in the afternoon, and fall to 97° or 98° F. in the early morning hours. Night-sweats are not usually persistent, if indeed present, unless there be also some more active form of the disease in the system. In many cases, however, the symptoms are complicated by tuberculosis of other parts, and the patient usually dies of general or pulmonary tuberculosis, rather than peritoneal. In many cases the local and general condition improves, the symptoms subside, and the patient recovers, and may remain in quite good health until a new development of the disease, either in the abdomen or elsewhere, takes place.

**DIAGNOSIS.**—The diagnosis is based upon the symptoms already given, upon the mild character of the disease, and the tendency to improve, instead of growing gradually worse, as in other kinds of tuberculosis of the abdomen. An indefinite resonant tumor or tumefaction of chronic character is sometimes found, unaccompanied by ascites. Exudates connected with appendicitis and septic salpingitis are differentiated by the characteristic acute symptoms that precede them. The presence of tuberculosis elsewhere would lead us to suspect the true nature of the affection.

**PROGNOSIS.**—The prognosis is often favorable so far as the local condition is concerned. The chief danger lies in the presence of the tubercle bacilli in the system, leading to development of tuberculous inflammation elsewhere or in other portions of the abdominal cavity. Many cases, however, recover without recurrence.

**TREATMENT.**—The treatment consists mainly in promoting the curative process that is already going on. If there be but few symptoms, ordinary hygienic management, tonics, change of occu-

pation, etc. will be sufficient. Gastro-intestinal derangement, abdominal tenderness, tympanites, and emaciation call for more careful treatment. The irritability of the stomach should be relieved by appropriate remedies, the bowels regulated, and an abundance of easily-digested food given. If there be much abdominal tenderness and tympany, the patient should be kept quiet, the circulation and nutrition maintained by massage and large quantities of good milk and cod-liver oil. Counter-irritation over the abdomen and electricity in moderate dosage may have some beneficial influence. When the symptoms subside, active outdoor exercise and the ordinary general treatment for tuberculosis should be recommended.

### *Caseous Tuberculosis.*

The caseous or ulcerative form of peritoneal tuberculosis gives rise to a variety of conditions. The parietal, visceral, and omental peritoneum and subperitoneal glandular structure may be the seat of degenerating tubercles. In some cases all the abdominal viscera are agglutinated by caseous tubercular substance and false membranes. Sometimes the adhesions include one or more small accumulations of yellowish, reddish, or brownish serum of variable density, containing flakes of lymph-granular débris, and not infrequently pus and blood-corpuscles and tubercle bacilli, or the entire fluid may be puriform, or one accumulation may be serous and the other purulent. Pus-collections between and over agglutinated intestines or viscera may, by ulceration, give rise to intervisceral or external fistulæ. Thus in children, umbilical fistulæ have often been recorded; in the pelvic tuberculosis of women, rectal fistulæ; while, after operation and upon the post-mortem table, viscero-abdominal or intervisceral fistulæ. More often this cheesy infiltration and agglutination of viscera are localized, in some part or parts of the abdominal cavity, forming a tumor-like mass. Occasionally general ascites coexists with localized deposits, but more often there is either none or there is one large encysted accumulation surrounded by a capsule of thickened and infected peritoneum and adherent intestines. Local abscesses may burrow through adhesions or in connective tissue for a long distance, and become surrounded by a large area of induration before finding an outlet.

Among the favorite places for this variety of peritoneal tuber-

culosis to show itself are about the liver, the cæcum, the omentum, and the uterine appendages.

The peritonitis about the liver is always secondary to cheesy tuberculosis of the liver, and is a very rare affection.

Agglutination of the intestines about the cæcum, with cheesy deposits and abscess, that burrow across the abdomen, or upward or downward, or discharge into the rectum, has been frequently met with. Some of the cases described have probably been old cases of appendicitis either with or without secondary infection by the tubercle bacilli.

Tuberculosis sometimes attacks the omentum, particularly in children, and may retract and roll that membrane in the shape of a hard tumor extending across the upper abdomen, or may go on to abscess-formation, and either ulcerate externally at the umbilicus or into an intestine, or both.

Pelvic peritoneal tuberculosis in women is usually connected with tuberculous salpingitis. The peritonitis, if extensive, generally assumes the encysted form, one large cyst reaching up into the abdominal region, sometimes to the umbilicus, and almost entirely across, with occasionally one or two small separate sacs in the recto-uterine pouch and under the appendages. In these cases the appendages and the surrounding exudate form a hard mass that extends from the uterine horns to the sides of the pelvis. The solidified appendages, the uterus, upper part of the bladder, pelvic walls, lower anterior abdominal wall and adherent intestines are covered by a thick, friable, grayish, or yellowish peritoneal exudate, which can usually be readily separated from the intestines superiorly, but which often adheres firmly to the parts in the pelvis. Tubercle bacilli are frequently found in the tubes, and signs of tuberculosis may exist elsewhere in the system.

**SYMPTOMS AND COURSE.**—Caseous tuberculosis of the peritoneum usually gives the history of repeated attacks of peritonitis, which may have been recognized as such or may have been mistaken for gastric or intestinal disorders, typhoid fever, pyosalpinx, appendicitis, etc. Between these attacks the symptoms may subside and the temperature remain subnormal, particularly in the early morning, for weeks at a time, and but little discomfort be felt. Usually, however, there is an afternoon rise of temperature to 100° or 101° F., some tympany and abdominal tenderness, and occasional pain in the intestines or pelvis. At the same time the appetite is

impaired, and the bowels either obstinately constipated or alternately relaxed and constipated, with attendant loss of flesh. In more advanced cases there may be occasional or persistent vomiting or diarrhea, great abdominal distension from intestinal gases or ascites, or both together, with marasmus and night-sweats. Obstruction of the bowels has been noted in a few cases. Pleurisy is not a rare complication, and pulmonary tuberculosis will be detected in most cases before the fatal termination.

In some cases the nutrition is but little impaired, and only the signs of local inflammatory action of the uterine appendages or over some other circumscribed area are to be found.

DIAGNOSIS.—The condition of the patient often simulates that of typhoid fever when the tubercles are localized about the cæcum. The previous history of abdominal symptoms, the absence of the typhoid eruption, the preceding prolonged record of a moderate afternoon rise in temperature, palpable induration about the cæcum, and its occasional extension out from the iliac region, tuberculosis elsewhere, and the continuance of symptoms after the first three or four weeks, with perhaps a family history of tuberculosis, will generally help us to arrive at a definite diagnosis, although in obscure cases considerable time may elapse before the differences can be made out.

Appendicitis has a history of short, localized, acute attacks with complete intermissions, while the preceding acute attacks of tuberculosis, if severe, are less localized, or, if not severe, are of a more remittent character. Extensive tympanites, pronounced derangement of the intestinal secretions, and the emaciation and general symptoms of the tuberculous condition are not usually noticed in appendicitis. A mild attack with a moderate rise of temperature for a few days, and then a sudden lighting up of general peritonitis, is characteristic of appendicitis, as is also the localization of the exudate and tenderness near the anterior superior spine of the ilium on a line extending from the spine to the umbilicus.

The local signs may be confounded with malignant, or even benign, abdominal growths, but the general symptoms will usually enable us to decide in favor of tuberculosis.

Peritonitis accompanying septic salpingitis shows more decided regressions, improves more by rest in bed, and has a history that points to its septic origin.

Encysted tubercular peritonitis, particularly that form connected

with tubercular salpingitis, may simulate an ovarian cyst. In the former case, however, we can detect the enlarged tubes *per vaginam*, and by the bimanual examination detect an intestinal tumor that is connected with the diseased appendages. The tumor as felt over the pubes is not so firm as an ovarian cyst and gives larger waves of fluctuation. The percussion note shades off gradually from dullness to resonance. The encysted fluid has not the definitely rounded outline of a single ovarian cyst. The afternoon rise of temperature, emaciation, and general signs of tuberculosis indicate the true nature of the infection.

Thin-walled parovarian cysts often give the same kind of wavy fluctuation, but they are of a definite rounded outline and not connected with indurated appendages. The percussion note becomes resonant more abruptly.

PROGNOSIS.—The prognosis is usually bad. The disease is no longer in the first stage, and tends to local disorganization and general infection. A few cases are cured by operation. After a fecal fistula has formed an early fatal result may be expected.

TREATMENT.—The medical treatment is similar to that already recommended for the other varieties, and can only be considered as palliative. The surgical treatment consists in the removal of peritoneal fluid by abdominal section with such affected parts (uterine appendages, omentum, etc.) as may be practical, the separation of such adhesions as may be necessary to evacuate local fluid accumulations and relieve intestinal paralysis or obstructions, and the dusting of the parts with about a dram of iodoform powder.

The removal of the uterine appendages has already been referred to. The accompanying sacculated effusions should be removed so as to leave the cavity dry, and the false membrane sponged clean of all lymph and debris. Sometimes we may have to content ourselves with doing this, without disturbing the appendages. When the appendages are removed, the integrity of the sac is necessarily destroyed at its lower end, and it is then well to remove all of the sac that can easily be detached, for fear that it might undergo degenerative changes.

In the first case of this kind operated upon by the author, he left the entire sac, excepting the portion removed with the appendages, and had for a result a suppuration commencing on the ninth day. On the twenty-seventh day a counter-opening was made in the cul-de-sac of Douglas. About a week after that a fecal fistula formed.



The patient died seven weeks after the operation, with the fistula still discharging pus and feces.

Profiting by this experience, the upper part of the sac was removed in the next case, leaving only a small, firmly adherent portion in the recto-uterine pouch, the drainage-tube being removed in fifty hours, and the patient cured. The patient eighteen months after the operation was teaching school, in better health than for years. In three years, however, she was dead.

The next case had incipient pulmonary tuberculosis, with a history of acute attacks of pneumonia and pleurisy. In addition to a pint of sacculated peritoneal fluid, an abscess containing cheesy matter was found filling the recto-uterine and lateral peritoneal cul-de-sac. Both tubes contained cheesy pus. The left was so friable that the ligatures cut completely through and could not be reapplied. Removed all of the sac possible. Drainage-tube used for thirty hours. Recovery without a bad symptom, and passed from observation.

When the disease is up among the intestines and the coils are firmly matted together, it is usually better not to separate them, for a fecal fistula may already have formed between them or may be produced by the operation. Drainage is necessary in most cases, but it should usually be made with a glass tube and the tube taken out as soon as possible. When intestinal coils have been opened, they should, if possible, be sutured and the areas be shut off from the general peritoneal cavity by an iodoform-gauze tampon. Even in such cases temporary improvement may follow.

The good results of abdominal section even in caseous tuberculosis are sometimes surprising, and many cures are recorded. Instead of the general peritoneum becoming infected, the healthy membrane seems to help in curing the diseased portions.



## DISEASES OF THE VULVA AND VAGINA (NON-MALIGNANT).

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### HYPERTROPHY OF THE EXTERNAL GENITALS.

THE parts most frequently subject to hypertrophy, whether congenital or acquired, are the *nymphæ* or *labia minora*. In women, with liberal development of subcutaneous fat, the nymphæ are often entirely concealed by the labia majora. Ordinarily, they project far enough for the edges to be seen. Occasionally, however, they project like wings folded over the vestibule or unite over the clitoris to form an apron, or one or both may be divided into one, two, or more folds, forming double, triple, or even quadruple nymphæ; or one labium may be larger than the other; or they may extend down and unite in front of or behind the anus, and cover up the vestibule so completely as to cause great annoyance, and may even require an operation for their removal. Among the Bushmen and Hottentots the labia minora often become enormously developed, and hang like thick aprons down to the knees.

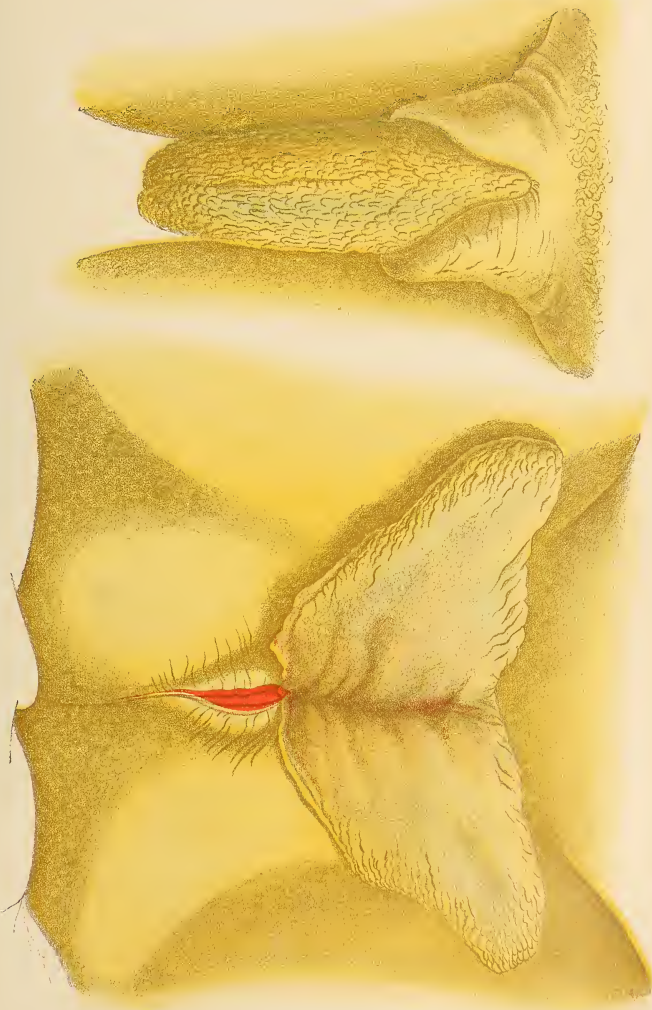
Inflammation may result in cases of hypertrophied nymphæ from the friction of walking, riding, or excessive venery. Sexual irritation undoubtedly causes enlargement and even hypertrophy, but should not be considered as the usual cause.

The remedy for these conditions consists in amputation and sewing up of the edges with fine catgut or, preferably, silkworm-gut.

The *labia majora* vary greatly in size in different women, sometimes projecting like cushions tightly pressed together, and sometimes consisting merely of loose folds of skin on either side of the exposed nymphæ. The latter condition is often found in very thin and in old women. Occasionally the labia will extend down so as to form a fold in front of the anus, and have even been known to surround the anus. A superabundance of labial fatty tissue not only conceals the labia minora, but sometimes seems to draw apart the folds that form the latter to such an extent as almost to obliterate them.

The *clitoris* is relatively larger in children than in adults, because

PLATE XIII.

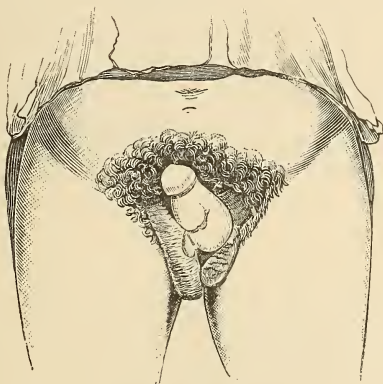


Hypertrophy of Labia Minora (Hottentot Apron).



toward puberty the developing labia gradually project over and cover it. True hypertrophy of the clitoris is much less frequent than of the nymphæ. Occasionally, however, the clitoris is found to attain the size of a boy's penis, with powers of erection, and when accompanied by adhesion of the labia may conceal the sex. An amputation may become necessary, on account of the abnormal direction of the stream of urine, friction, excoriations, etc., particularly when occasioning trouble in childhood.

FIG. 49.



Hypertrophy of the Clitoris.

#### ADHESIONS OF THE LABIA.

Adhesion of the labia usually occurs in infancy and in childhood, and occasionally is found in adult life. It consists merely in an agglutination of the surfaces without loss of epithelium or organic union. Deficient hardening of the epithelium has been given as a cause, and comparison has been made with the adhesion of the prepuce to the glans in the male. Uncleanliness, irritating discharges, and mild forms of inflammation may lead to it.

It usually causes no symptoms, but may give rise to inconvenience by directing the urine upward. Later, menstrual fluid may be retained or may be expelled with difficulty. Coitus is usually interfered with, although not always. A woman in labor in whom the vagina could not be found, although the head was

down upon the perineum, was recently observed. What at first seemed to be the vagina was an enormously dilated urethra, through which the finger easily and painlessly entered the bladder, and through which copulation had taken place. The occluding labial diaphragm was punctured a little below the urethra in the median line, the opening torn large enough to admit two or three fingers, and the advancing head accomplished the rest. The puerperium was normal, and the parts afterward regained their natural relationship.

In young children it is only necessary to separate the labia forcibly, and to keep the parts cleansed and lubricated for a few days to prevent an immediate recurrence. In older people the best way is to introduce a bent sound into the vagina, just under the urethra where a small opening can usually be found, and to tear the labia asunder from within outward by dragging the sound out between them. When such an opening cannot be found, and the parts are not separable by moderate force from without, menstruation may be awaited. The vagina will then become filled and the labia put upon the stretch by the retained fluid. The bladder should be emptied, a sound placed in it, a finger introduced into the rectum, and a bistoury trocar plunged into the fluid mass, in the median line, a little below the urethra. The opening should then be enlarged until the finger can enter the vagina, when the adherent labia are separated. Subsequent care prevents reunion.

Organic union of the labia, due to traumatism or ulcerative inflammation, has been known to take place and requires operative measures similar to the last mentioned. (See "Atresia of the Vagina.")

### VULVITIS.

There are three varieties of vulvitis, or inflammation of the vulva—viz.: simple, purulent, and follicular.

*Simple Vulvitis* is generally caused by local irritation. Acrid vaginal discharges, dirt, accumulated secretions, dribbling urine, parasites, traumatism from scratching, friction, and masturbation are the most common causes.

Increased redness with more or less tumefaction and watery or mucus discharges are characteristic.

Burning pain, particularly upon the passage of urine, and persistent itching are the main symptoms.

The TREATMENT should be directed to the removal of the cause.

PLATE XIV.

FIG. 1.



Hypertrophy of Right Labium Majus. Fistula of Ischio-rectal Abscess, with Syphilitic Eruption on Buttocks.

FIG. 2.



The same. Labium suspended. Syphilitic Eruption faded, and Fistula contracted under specific treatment for two weeks.





Copious hot water, or  $\frac{1}{2}$  of 1 per cent. aqueous saline douches, 1 or 2 per cent. carbolated aqueous douches, or acetate of lead, a teaspoonful in one or two quarts of water, or a  $\frac{1}{1000}$  or  $\frac{1}{2000}$  solution of bichloride of mercury, are useful when acrid or fetid vaginal discharges are present. Lotions of acetate of lead, carbolic acid, or tannin should be used externally, and may be continuously applied on cloths, if the patient can be kept quiet. Or, the oxide-of-zinc ointment, to which 5 per cent. of carbolic acid or 2 per cent. of menthol is added, may be frequently applied, and often gives great comfort and relief. The milder applications should be used in the beginning of the attack; the stronger in the advanced stages.

*Purulent Vulvitis* results from the same sources as simple vulvitis, and is often an advanced stage of the same. Gonorrheal infection is a frequent cause. Direct infection by septic matter may be the primary cause.

Redness, tumefaction, and a muco-purulent discharge are always present. In aggravated and neglected cases, eroded and ulcerated spots are found on the inner surfaces of the labia, and sometimes excoriations on the inner surfaces of the thighs.

The SYMPTOMS are the same as in simple vulvitis, but intensified. A moderate degree of febrile reaction and restlessness at night are often noticeable in children thus affected.

Although the disease may pass over without treatment, it should not be forgotten that there is danger of progressive infection of the vagina, uterus, and Fallopian tubes.

The TREATMENT must have special reference to the septic nature of the disease. All that would be necessary, in addition to such treatment as has been given for simple vulvitis, is to obtain and maintain perfect cleanliness. This requires more care than is ordinarily understood by that term. If we could wash off the pus by constant irrigation with plain water, or  $\frac{1}{2}$  of 1 per cent. solution of chloride of sodium, or wash the parts every half hour or hour with a saturated solution of boracic acid, the pus-microbes would soon be exterminated, and a mild form of simple vulvitis established, or a perfect cure attained.

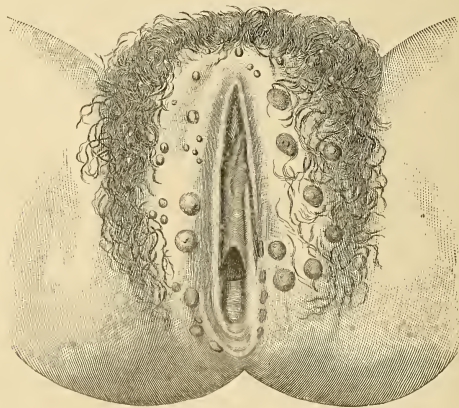
Warm sitz-baths in  $\frac{1}{2}$  or 1 per cent. saline solution, three or four times daily, are of great benefit in removing secretions. The parts should be bathed as nearly every hour as possible with the saline or boracic-acid solution until the tenderness has somewhat subsided, and then with a weak acetate-of-lead or tannic-acid solution,

and the case treated the same as in simple vulvitis. Cloths wet in these solutions may be used at night instead of frequent washings. After the discharge is partly checked, dry pieces of absorbent cotton, soaked every hour or two and reapplied, after a mild astringent or antiseptic lotion has been used and the parts thoroughly dried, constitute the very best kind of dressing.

The stronger astringents and antiseptics, such as a 2 per cent. solution of nitrate of silver or a  $\frac{1}{2000}$  solution of mercuric bichloride, are required only in neglected cases and those that cannot be frequently dressed. As the parts cannot be cared for as often in the night, the mercuric or silver solution may be advantageously used at bedtime.

*Follicular Vulvitis* is the name given to the inflammation of the glands of the vulva. Sometimes the sebaceous and piliferous glands are enlarged and project like minute papillary elevations upon the

FIG. 50.

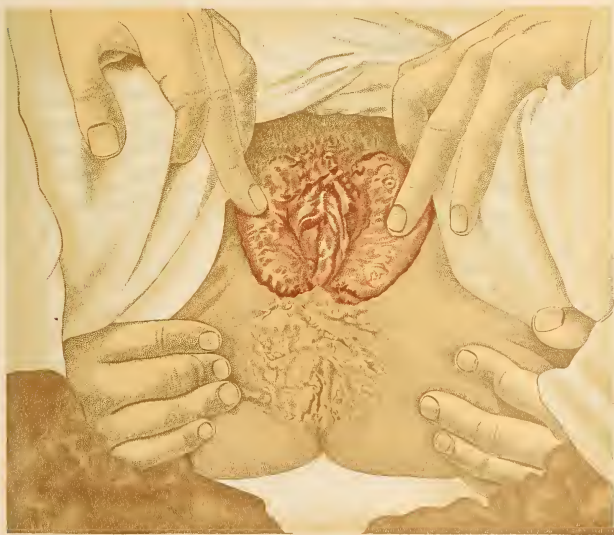
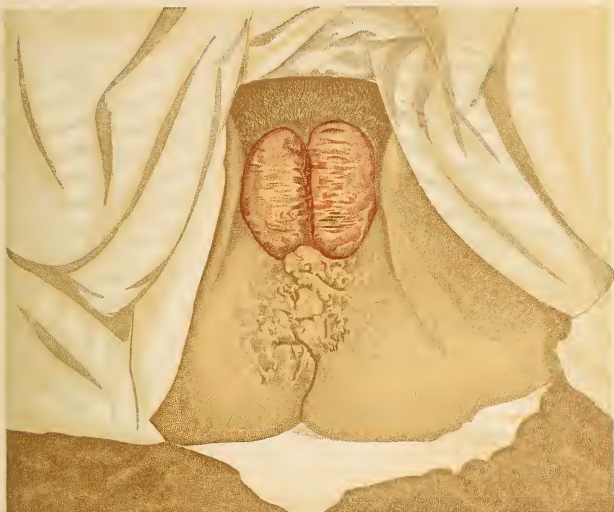


Follicular Vulvitis.

surface of the labia and prepuce. This enlargement of the separate glands is produced by the distension with mucus or muco-pus, which may be seen to exude from them. At other times there are no distinct elevations, and the inner surface of the vulva is covered by an offensive mucus or muco-purulent secretion.

The CAUSES are, want of cleanliness, vaginal discharges, pregnancy, discharge from malignant disease, and a reduced state of vitality.

PLATE XV.



Hypertrophy of both Labia Majora, with hypertrophy of the skin over the perineum and buttocks and about the anus.



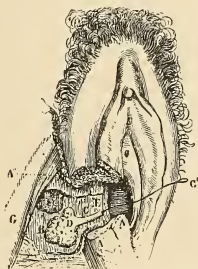
The SYMPTOMS differ but little from those of the other forms of vulvitis described above.

The TREATMENT in mild cases is similar to that of the simple and purulent forms. It is, however, more often necessary to use the nitrate-of-silver and corrosive-sublimate solutions. The emptying of the follicles is necessary to a cure, and may be promoted by alkaline fomentations, pressure by means of dry absorbent-cotton pads, manual pressure, or better by puncturing with a bistoury or a bayonet-pointed uterine scarificator. When thus evacuated nitrate-of-silver solution or tincture of iodine and glycerin, in equal parts, may be applied.

#### INFLAMMATION AND ABSCESS OF THE VULVO-VAGINAL GLANDS.

Purulent vulvitis or vaginitis is apt to infect the vulvo-vaginal or Bartholini's glands.

FIG. 51.



Normal Vulvo-vaginal Gland. The labium majus and minus, the sphincter vaginae muscle, and the bulb have been partly removed on the right side in order to expose the gland: *A, A*, section of labium majus and minus; *B*, gland; *C*, excretory duct; *C'*, stylet introduced into the duct; *D*, glandular end of duct; *E*, free end of duct; *F*, section of bulb; *G*, ascending ramus of ischium.

The SYMPTOMS are, swelling of the deeper tissues on the inside of the lower part of one or both labia, usually one at a time, with enlargement, and often a distinct globular tumor that may vary in size at different times, as the gland is filled up or has emptied itself. In most cases there is a small area of redness around the mouth of the gland, just in front of the hymen or its remains, halfway up the side. A muco-purulent secretion may exude or be squeezed out. In old cases the only symptom may be an occasional filling up of one of the glands with a corresponding globular tumor, deeply seated in the labium, which persists and gives rise to local pain for a few



days, and then discharges more or less gradually, giving no more trouble for the time. In such cases there is but little, if any, surrounding induration.

The TREATMENT consists in the ordinary treatment for vulvitis, and in hot fomentations to relax the orifice and thus promote the discharge. If the tenderness be not too great, evacuation by gentle pressure may be attempted. Drainage by means of dilatation with a small probe may be adopted in obstinate cases of recurrent accumulation.

Abscess of the gland may result from retention of pus. In this case the lower outer part of the labium becomes indurated, and presents the ordinary characteristics of labial abscess. The pus may be evacuated into the cellular tissue of the labium and a labial abscess coexist.

Excision of the whole gland and surrounding abscesses, and sewing up of the parts by deep sutures will often effect an immediate cure. In case the parts cannot be excised, the secreting surface should be destroyed by a cautery, the surrounding pus-surfaces curetted, and the cavity packed with iodoform gauze and absorbent cotton until healed. The external incision should be a large one.

*Labial Abscess* has the same etiology and symptomatology as abscess in the subcutaneous connective tissue elsewhere. The labium becomes enlarged with a well-defined indurated mass, extending up and down the labium under the hairy surface. After a few days the phlegmon gradually undergoes softening at some particular place, and an area of redness appears. The affection is very painful and calls for energetic treatment. Cold, in the beginning, is anodyne as well as sedative. Later, sitz-baths, poultices, or fomentations, frequently changed, are to be used. On account of the tendency to spread, an early evacuation, by incision on the inner surface, is indicated. In chronic cases connected with the suppuration of the vulvo-vaginal gland, all of the pus-secreting surfaces and indurated tissue must sometimes be excised or curetted with a sharp curette, to get rid of deep-seated sinuses and pockets that resist ordinary treatment.

#### EXANTHEMATA OF THE VULVA.

*Herpes, Eczema, and Prurigo* of the vulva present similar characteristics to the same symptoms in other parts of the body.

*Herpes* is usually a transient affection, and requires only that the

PLATE XVI.



Distended Vulvo-vaginal Gland.



parts be protected from irritation. It consists in a group or groups of vesicles, without any inflammation of the surrounding skin. The inguinal glands are occasionally tender. A saline laxative, a bland ointment, or a soothing lotion, and a mildly carbolated or a borated vaginal douche, if the vaginal discharges be irritating, will usually be followed in a week or ten days by a cure. A powder of oxide of zinc and chalk, equal parts, may be used after the vesicles break.

Sometimes herpes occurs in the confluent form, covering the vulva, and lasting for ten days or two weeks. It is often connected with gastro-intestinal disturbances, and may return periodically. Uncleanliness is a prolific cause.

*Eczema* is characterized by an eruption of vesicles and some inflammation of the underlying and surrounding skin. When the vesicles rupture a serous fluid exudes which tends to dry on the surface and form scabs. If the disease continues, the skin remains red, becomes thickened, and may in time assume a more or less cicatricial character. These conditions may spread to the neighboring skin. Itching is a prominent symptom. The itching that accompanies diabetes is apt to be due to eczema.

In the acute stage, saline or mercurial laxatives, a restricted diet, with soothing local applications, such as bismuth powder, a lead lotion, cold cream, 1 per cent. carbolic-acid douches, hip-baths, or the benzoated oxide-of-zinc ointment with 5 or 10 per cent. of carbolic acid added, may be used. In obstinate cases strong solutions of carbolic acid (5 per cent.), or nitrate of silver (2 per cent.), may be required to stimulate the circulation of the parts. The scabs and secretions should be washed off with almond or other unirritating soap before the ointments are applied. Saline and mercurial laxatives, digestives, iron, arsenic, etc. may be required as for eczema elsewhere. Dryness and cleanliness of the parts are essential, and friction is to be as nearly excluded as possible.

*Prurigo* is a papular eruption causing distressing pruritis, and is difficult of cure. The causes are not well understood, although it often occurs in unclean and unhealthy subjects.

Attention to the general health and hygienic surroundings is imperative. The carbolized zinc ointment above referred to, with the addition perhaps of 2 per cent. of menthol, often affords great relief. From a 5 to a 10 per cent. solution of chloroform in oil of sweet almonds relieves the itching in some cases, and may do some-

thing toward dissolving out the tenacious masses at the bottom of the papillæ. A mixture of ether and alcohol (1:4) may be used for this latter purpose, or chloroform and alcohol (1:4) if well borne.

*Erysipelas* and *Diphtheria* of the vulva should be treated upon the same principles as cases occurring in other parts. They are rare affections, and occur in most instances in puerperal women and new-born children.

#### GANGRENE OF THE VULVA OR NOMA.

Gangrene of the vulva occurs in poorly-nourished young children living in unhygienic surroundings, and is exceedingly fatal. It begins with reddening and infiltration of one of the labia, accompanied by a discharge of ichorous serum, followed by vesication and the formation of a grayish-green slough and rapid gangrene. The condition has been likened to noma in the mouth. It is a rare disease, produced by infection, and has been known to be infectious.

If recognized early enough, the parts should be excised, and the resulting wound, if not favorable for obliteration by sutures, should be frequently disinfected with strong antiseptics and kept constantly moistened with a weak antiseptic solution. The vital powers should be sustained with alcohol, strychnia, digitalis, and frequent forced feeding.

#### PRURITUS VULVÆ.

*Pruritus Vulvæ* is usually a symptom rather than a disease, and stands for an intense or persistent itching of the vulva, more often felt about the clitoris and vestibule, but sometimes extending to the surrounding parts. The itching, depending upon palpable or visible local inflammatory disease, is not referred to in the consideration of this affection. It is often a serious trouble, in that it is apt to lead young people into the habit of masturbation, but should not be confounded either with the irritability attendant upon that habit or with nymphomania.

The CAUSES may be reflex or local. Irritating and indigestible foods or drinks may bring on the attacks in some cases by reflex action or by vitiating the urine. The rubbing of clothes, the friction of walking, and heat of the bed act as exciting causes in those predisposed to it. Local congestion, such as occurs about the menstrual period, or in certain cases of pelvic inflammation, or in early pregnancy, or at the end of pregnancy when the vulval and

vaginal veins are distended by pressure above, or in old people with dilated veins, is an occasional cause. Constipation, sedentary habits, portal congestion, œdema, etc., favor it. Irritating discharges though scanty from follicular cervicitis, carcinoma, uterine sarcoma, diabetes, and incontinence of urine, are sometimes responsible. Parasites may also act in the same way. A chronic follicular inflammation that can only be discovered by a careful examination is present in many cases.

The DIAGNOSIS is based upon the intermittent character of the itching, the absence of local inflammatory or eruptive disease, and the discovery of one of the above-mentioned or other remote causes. Oftentimes no cause whatever can be detected. The local symptoms are a shiny, red, somewhat œdematous appearance of the parts about the vestibule, with perhaps some serous secretion. Later, changes may occur as the effect of scratching, such as excoriations, thickening of the nymphæ, dryness, cicatricial spots, and furuncles.

The TREATMENT should of course depend upon the cause, which must, if possible, be removed. When dependent upon diabetes or incontinence, the parts should be protected from contact with the urine by some powder or ointment kept constantly applied, such as bismuth subnitrate, unguentum resinæ, or a benzoated oxide-of-zinc ointment containing 5 or 10 per cent. of carbolic acid. When from irritating vaginal discharges, the applications may be used with antiseptic vaginal douches and vulval washes, such as 1:2000 aqueous solution of mercuric bichloride or 2 per cent. carbolic acid. Skene highly recommends a 1:500 solution of the bichloride in emulsion of bitter almonds. When due to venous congestion, astringents act beneficially, such as lead, in washes and in vaginal douches, a 1 or 2 per cent. solution of nitrate of silver in water, or the oxide-of-zinc powder, strong or diluted with an equal quantity of chalk. General debility, gastrointestinal derangements, uncleanliness, and the like should be attended to faithfully. To relieve the itching many remedies have been used. The benzoated oxide-of-zinc ointment, with the addition of 10 per cent. carbolic acid or 5 per cent. of menthol, is useful. A 10 per cent. emulsion of chloroform in olive oil or a 5 per cent. aqueous solution of cocaine gives temporary relief. Cold-water applications stop the itching when other remedies fail. The treatment is of necessity often empirical. Many patients suffer continuously for years without obtaining relief. Under the most favorable cir-



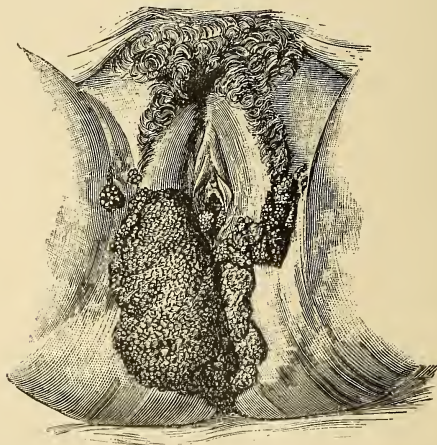
circumstances a cure is difficult and is only obtained by persistent attention to the details of treatment. Cleanliness, dryness, and a minimum amount of friction add materially to the desired result.

#### SPECIFIC DISEASES OF THE VULVA.

*Gonorrheal Vulvitis* is an inflammation of the vulva caused by the specific germ of gonorrhea, and may be considered as a part of specific or gonorrheal vaginitis.

*Syphilitic Affections of the Vulva* occur in the form of chancres, mucus-patches, and syphilitic skin eruptions. The chancre has a dark-red surface, is sharply defined, is not excavated, is not tender or itchy, is single, with a hard base, and presents firm resistance

FIG. 52.



Simple Vegetations of the Vulva.

to the fingers grasping it from the sides. Inguinal glands are ordinarily enlarged without much tenderness.

The ulcerations or eruptions following vulvitis are itchy, tender, somewhat excavated, and have not a firm base, except in connection with surrounding infiltration. Mucus-patches, gummata, and the skin eruptions exist in connection with other manifestations of syphilis, and have the same characteristics as those occurring elsewhere. The inguinal glands may be tender, but do not become

greatly enlarged. A chancre may ulcerate at its centre, but preserves its characteristics at the edges.

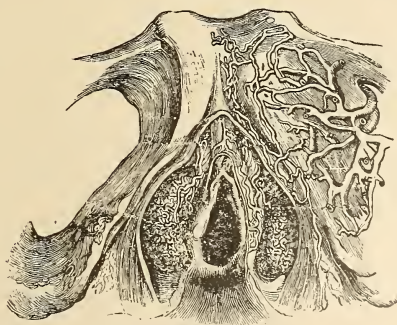
The *Chancroid* is multiple, has sharply-defined edges, suppurates freely, has a soft yellowish or greenish fissured base, and is usually accompanied by a large, tender inguinal gland, with tendency to suppuration. The sharp edges and yellowish or greenish base distinguish it from other ulcerations or eruptions. It should be treated by cauterization, iodoform, and frequent antiseptic lotions.

*Venereal Warts* are the result of venereal or unclean genital discharges. They consist in irregular masses of papillomata about the anus or vulva. Vaginal douches of 1 : 2000 bichloride of mercury, frequent washings with the same, the constant application of the oxide-of-zinc ointment with 10 per cent. carbolic acid, or of resin cerate, will occasionally result in a cure. Cauterization with nitro-muriatic acid is usually effective. When much elevated above the surface of the skin (condylomata), they should be cut off and the base cauterized.

#### INJURIES OF THE VULVA.

Injuries to the external genitals in women and children from blows, falls from elevated places upon the end of stakes, pitchforks, backs of chairs, fences, etc. sometimes prove serious from the hemorrhage that is liable to follow injury of the corpora cavernosa.

FIG. 53.



Plexus of Veins of the Vestibule.

The first marital embraces, and even brutal kicks by intoxicated husbands, have produced extensive contusions and lacerations.

Contusions should be treated as those occurring elsewhere in the cutaneous tissue. Lacerations should be sutured with deep stitches, so as to close up all deep veins, and thus prevent extravasations of blood and subsequent abscess.

#### HEMATOMA OF THE VULVA.

*Hematoma* of the vulva occurs in the puerperal state as the result of the pressure of the head during labor, or in the non-puerperal state, from blows or fine punctures, producing a lesion of a vein in the corpus cavernosus. It is usually unilateral.

When found after labor it may be as large as the fist or larger, but is seldom half as large under other circumstances. It is felt as an elastic globular tumor in the labium, without much heat or tenderness, and unaffected by coughing or increased intra-abdominal pressure made by the patient. Often the first sign is a feeling of discomfort in the part, and the accidental discovery by the patient of the enlargement. In other cases a sudden burning pain is felt, followed by a feeling of tension and a desire to urinate or defecate.

The hematoma is either gradually absorbed, remains for a long time encysted, or undergoes the suppurative process.

An hematoma larger than a walnut, detected as soon as, or before the bleeding has stopped, is best treated by an incision between the labium majus and minus, a clearing out and disinfection of the cavity, and suturing so as to include the vessels and close the wound completely. A small effusion may be treated by the application of an ice-bag in the hope of preventing an increase. After the hematoma has formed and shows no sign of growing larger, it may be let alone with the expectation that it will be absorbed. When it has become encysted the patient may choose between having the cyst excised or waiting for a tedious length of time for slow absorption. To incise, evacuate, and pack the cyst with gauze, usually means a slowly-contracting cavity or an abscess; hence it is always well to enucleate or dissect out the cyst-wall and close the wound completely with deep sutures. After suppuration has commenced the abscess should be opened without delay, and, if possible, the abscess-wall excised and the wound sutured with antiseptic precautions. When the facilities for such treatment are wanting, incision, disinfection, and packing with gauze is the next best procedure.

*Varicose Veins of the Vulva* may be caused by pressure upon the pelvic veins by the pregnant uterus, intra-pelvic tumors or accumulations, or, in those predisposed to it, particularly in hot climates, by constipation, straining at stool, or occupations requiring constant standing with the exertion of intra-abdominal pressure.

During pregnancy they may form a swelling as large as the fist, and may rupture during labor, causing a large hematoma.

In the non-puerperal state they cause a slight swelling of one or of both labia, or can be seen on their inner surfaces, often extending into the pelvis.

They either give rise to no trouble or produce a feeling of burning, an itching or fulness, with perhaps a slight desire to urinate.

Astringent washes, vulval pads under a T-bandage, rest in the recumbent position for a few hours each day, and the avoidance of standing, leaning over and lifting, are helpful. The bowels should be well regulated, and the general nutrition and vigor of the patient promoted by tonics, massage, moderate exercise, fatty foods, etc.

When a varicose vein ruptures compression will usually control the hemorrhage temporarily, but, as it is pretty sure to return after the pressure is removed, the ligature should be resorted to.

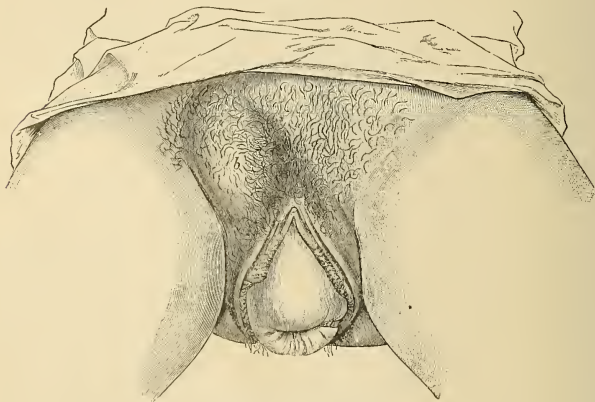
#### HYDROCELE OF THE LABIUM MAJUS.

*Hydrocele* in the female is a rare affection, and usually consists in a prolongation of the peritoneal pouch (canal of Nuck) along the round ligament, through the inguinal canal, to the mons Veneris and into the tissues of the labium majus. Usually the sac closes by adhesion of the peritoneal surfaces at the internal abdominal ring. The labium, particularly the upper part, is enlarged, as in the case of hernia, but with less fulness at the external abdominal ring. If the communication with the abdominal cavity be not obliterated, the swelling disappears when pressed, and may be felt to vary in size with increase or decrease of abdominal pressure (coughing, etc.). Usually, however, the tumor is elastic, translucent, and yields clear serum upon aspiration. It is *not* tender to moderate pressure. When the tumor is reducible a truss may be worn. When not reducible it may be aspirated. If it fills again, it should be evacuated, and obliterated by an injection of tincture of iodine. If this does not cure it, the entire sac should be dissected out and the parts sutured with silkworm gut.

## PUDENDAL HERNIA.

*Pudental Hernia* (*hernia labialis inguinalis*) corresponds to scrotal hernia in the male. The canal of Nuck and the inguinal canal become dilated, and the intestine and peritoneum are forced along the round ligament to the external ring and into the labium majus. A rounded tumor is felt in the upper part of the labium, prolonged into the inguinal ring, soft, insensitive to pressure, compressible, sometimes resonant upon percussion, and usually disappearing entirely, with a gurgling sound, if the patient be placed in the knee-chest position. It is very seldom strangulated. The omentum, and, very rarely, the ovary may be found in the sac.

FIG. 54.



Hernia Labialis Inguinalis and Uterine Prolapse.

It is differentiated from a distended vulvo-vaginal gland, in that the latter is well down in the labium, is tense, tender, irreducible, and cannot be traced upward. Vulval abscesses are tender and surrounded by indurated tissue.

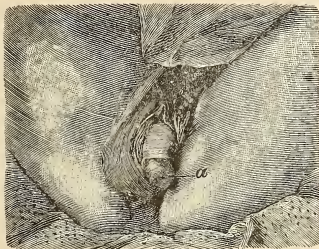
The TREATMENT consists in a replacement and the adjustment of a truss with a perineal strap to pass over the labium. A description of the operations for strangulated hernia and permanent closure of the inguinal canal belongs to works on general surgery.

*Posterior Pudental Hernia* (*hernia vaginalis labialis*) has been observed a few times. It appears in the posterior portion of the



labium majus, and consists in a defect in the pelvic fascia anterior to the broad ligament, with descent of the contents of the abdominal fascia along the vagina into the labial tissues.

FIG. 55.



Hernia Vaginalis Labialis.

The **DIAGNOSIS** is made in the same way as for the ordinary pudendal hernia, excepting that the contents extend under the

FIG. 56.



Hernia Vaginalis Labialis, extending into the Labium Major.

pubic ramus. Stoltz was able to feel the defect in the fascia and levator ani through which the protrusion occurred. According to



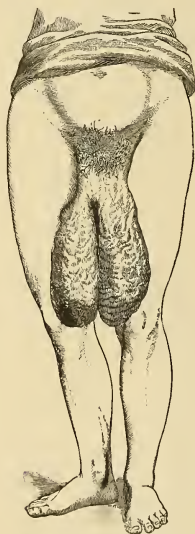
experience, pessaries and operations are useless. A belt with a pad attached to a stem may be adjusted.

### TUMORS OF THE VULVA.

*Elephantiasis.*—Elephantiasis occasionally affects the external genitals of the female, and exhibits the same characteristics as that occurring in the skin elsewhere. It usually affects the entire vulva, and in tropical countries has been known to form a large tumor hanging between the thighs.

The DIAGNOSIS is made by the fact that the swelling affects the skin itself and cannot be separated from it, as in fibroma, lipoma, and

FIG. 57.



Elephantiasis of the Labia.

cystoma. Venereal warts are implanted upon soft natural skin, while the papillary excrescences of elephantiasis grow upon thickened, indurated skin.

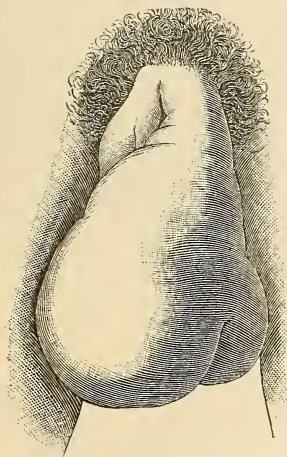
Malignant tumors are accompanied by deep-seated induration, and more ulceration in proportion to the enlargement; they run a

malignant course, while elephantiasis never kills. Lupus has more discoloration, deeper-seated induration, and ulcerates more extensively.

The TREATMENT consists in removal of the mass and suturing the wound.

*Fibroids of the Vulva* occur most frequently in the labia majora, but have been observed in the labia minora and perineum. They are hard, well defined, insensitive, and movable under the skin, unless developed in the cutaneous connective tissue, when they project and even become pendulous. They may undergo cystic degeneration. Sometimes they become quite large and the skin over them ulcerates. They should be removed by the knife as soon as discovered.

FIG. 53.

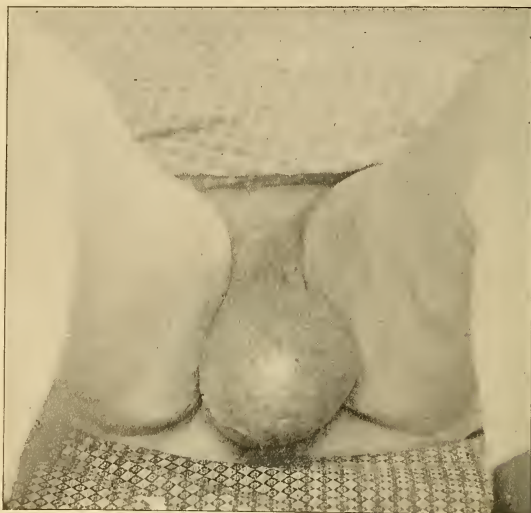


Fibroid of the Left Labium Majus.

*Vulval Cysts* are usually distended glands found in the labia majora, and may be single or multiple, deep-seated or superficial, varying from the size of a pea to that of a walnut or an egg, and occasionally larger. They are easily recognized as elastic bodies that yield a serous fluid upon aspiration. Usually they enlarge in a downward direction.

The best TREATMENT consists in the removal of the entire sac by dissecting it from its connective-tissue surroundings, and closure of the wound by deep sutures.

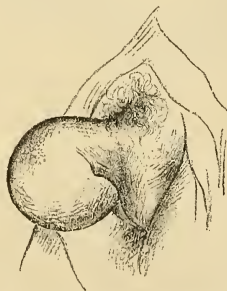
FIG. 59.



Cyst of Right Labium Majus.

Cystic tumors of the clitoris have been met with a few times. They usually contain a bloody fluid. Sometimes they gradually

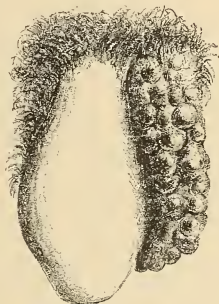
FIG. 60.



Cystic Tumor of the Clitoris, containing twenty-two ounces of fluid.

shrivel up, after having their contents evacuated, and at other times they require amputation. Sometimes they attain a moderate size, and then stop growing, and the patient may prefer to have nothing done.

FIG. 61.

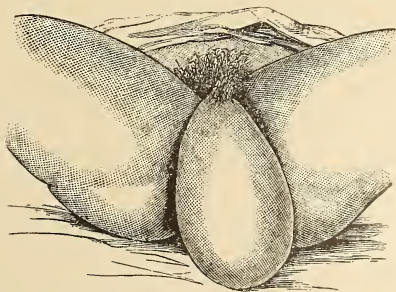


Tumor of the Clitoris.

#### LIPOMA OF THE VULVA.

Fatty tumors may occur in the vulval, as well as in other fatty tissue. Usually they are somewhat soft, and when a large size is attained, give a sense of fluctuation to the percussing finger. They are a little softer than fibroids, but the skin is somewhat hypertrophied, and is apt to be contracted in spots, corresponding to depressions between the lobules of the tumor. They may resemble elephantiasis, but fluctuate more distinctly.

FIG. 62.



Adipose Tumor of the Left Labium.

The TREATMENT consists in removal by the knife.

Occasional cases of Neuroma, Enchondroma, Melanoma, and Angioma of the Vulva have been observed, but their occurrence is so rare that a description is here superfluous. They should be removed the same as if found elsewhere in the body.

#### COCYGDYNIA.

*Coccygodynia* is the name given to pain in the coccyx, induced by motion of the part, whether from external pressure or contraction of the muscles attached to it.

The disease consists usually of a local arthritis. Not infrequently there is a rigidity or ankylosis of the joints, with dislocation or fracture, forming an artificial joint. Necrosis sometimes results.

Parturition in old primiparæ in whom the articulations have become rigid, and falls or blows upon the coccyx, are the ordinary causes. Rheumatism may possibly produce it. The principal symptom is pain in the coccyx upon sitting down, getting up or changing position. Any posture in which the coccyx is pressed up, or which calls into play its attached muscles, is intolerable. Sexual intercourse and straining at stool are apt to be painful. The disease is diagnosed by taking the coccyx between the finger, introduced into the rectum, and the thumb placed between the nates, and moving the bone, thus bringing on the pain.

Under certain circumstances the PROGNOSIS is favorable, although several months, or even years may elapse before all sensitiveness will subside.

The TREATMENT must be conducted upon the same principles as in a traumatic arthritis elsewhere. First, the avoidance of all motion of the joints or pressure upon the bone. Rest on the side, air-cushions to sit upon, with great care in sitting down, getting up, leaning over, or twisting the trunk, so as to avoid producing the pain, are items of prime importance. Leeching and cold applications in the acute stage, counter-irritation and alterative applications in the subacute and chronic stages, are beneficial.

In neglected cases, subcutaneous tenotomy or extirpation must occasionally be resorted to.

Tenotomy is performed by introducing a tenotome under the skin at the end of the coccyx, pushing it along the side of the bone, and severing the entire muscular attachment, first on one side and then on the other, and finally at the lower end. The

relief afforded is great, but often only temporary, on account of the reunion of the severed parts.

Extirpation is accomplished by a longitudinal incision down to the bone, amputation through the second joint, and severance of the attachments; or the attachments may be severed first, the coccyx dislocated backward, and the entire bone removed.

#### VULVO-VAGINAL HYPERESTHESIA AND VAGINISMUS.

*Vulvo-vaginal Hyperesthesia* consists in an extreme sensitiveness of a part, or of all parts, of the vulvo-vaginal entrance, except the labia majora.

In some cases there is a congested appearance of the parts, or even inflammation and erosion; in others there is nothing abnormal to be seen. The pathological conditions sometimes consist in inflammation of the inner genital organs, with or without irritating discharges, or in a disordered state of nutrition and enervation. Inflammation about the hymen or cicatricial contractions about the carunculæ cause the most severe forms.

The most noticeable symptom is sudden flinching or a manifestation of pain upon the least touch of the parts, although if the finger can be placed quietly on the hymen or in the vagina and left there, the complaints soon cease until some motion is made, when they begin again. Coitus may be excessively painful or not tolerated at all. Anything that alarms the patient, or even calls her attention to the condition, increases the difficulty.

The TREATMENT consists in removing all inflammatory conditions, if such exist, by the means recommended elsewhere. Soothing or anesthetic washes or ointments, such as a 5 or 10 per cent. solution of cocaine, or half that strength of menthol in cerate, or oxide-of-zinc ointment, may be used previous to all manipulations and at other times when discomfort is felt. Sometimes a 5 per cent. solution of nitrate of silver or strong carbolic acid applied once a week is useful to cure erosions or ulcerations.

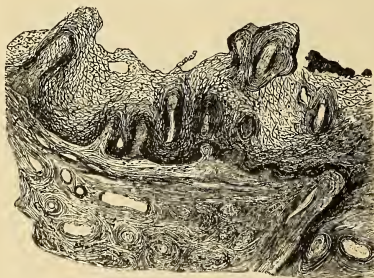
A valuable means of diminishing, and sometimes of curing the trouble in mild cases consists in introducing a bivalve speculum two or three times weekly, and slowly, almost insensibly, stretching the vagina and vaginal entrance until decided discomfort, but not severe pain, is felt, and then in placing a pledget of wool in the upper part of the vagina and leaving it for twenty-four or thirty-six hours. The pledget should be small at first, but gradually increased in size until



the vagina is well tamponed. It is preferable to place a small cotton pledget saturated in a 50 per cent. solution of boro-glyceride against the cervix, and the dry wool below it, but not low enough to press at the vaginal entrance. An uncomfortably tight vaginal packing or rough or painful treatment or manipulation in the beginning might antagonize the patient and make her worse. Mildly stimulating and antiseptic vaginal douches, such as 2 per cent. carbolic acid or 1 : 200 to 1 : 500 solutions of permagnate of potassium, often help to render the vulvo-vaginal nerves tolerant. A general tonic treatment is of great benefit in many cases.

*Vaginismus* is a vulvo-vaginal hyperesthesia of an aggravated character, with peculiar painful spasmodic contractions of the perineal and levator ani muscles. The causes of both affections are similar, but small spots of erosion about the vaginal entrance or a diseased condition of the hymen or its remains are more frequently found in vaginismus. Frequently no cause whatsoever can be discovered.

FIG. 63.



Fibro-papillary Hypertrophy of the Hymen in a case of Vaginismus.

Coitus is seldom tolerated, and the attempt causes a firm closure of the vagina by the contraction of the constrictores cunni et vaginæ. A vaginal examination is often impossible until the patient is anesthetized, when the orifice becomes relaxed.

In mild cases the TREATMENT given above for vulvo-vaginal hyperesthesia may be tried, especially the vaginal packing. Sometimes a thorough stretching under anesthetics, with the subsequent daily introduction of a glass plug dilator, will effect a cure. The stretching can be accomplished by introducing a large bivalve speculum, separating its blades widely, and withdrawing it quite rapidly.

The glass plug, which has the shape of a widened test-tube, about  $2\frac{1}{2}$  inches in diameter, should be worn four or five hours a day for a few days, then two or three hours a day for several weeks.

In a few cases it may become necessary to practise J. Marion Sims's plan of excising the hymen and cutting deeply into the constrictor cunni and edge of the levator ani on either side, so as to completely relax the vaginal entrance.

FIG. 64.



Vaginal Plug.

The plug should then be worn almost constantly for a few days, then two or three hours daily for ten days or two weeks. Inter-course should not be allowed until the wounds have been for some time entirely healed.

#### KRAUROSIS.

Kraurosis represents the last stage of vulvitis. Small red spots and streaks appear on the labia minora, in which dilated capillaries can be seen. These spread in curves, and often disappear in the places first observed. Later the mucous membrane becomes pale, and shrinks progressively until in time the nymphæ disappear and the vulva is almost closed.

At first there is round-celled infiltration and dilation of the capillaries, and hypertrophy of the epithelial covering, which is followed by a thinning of the rete mucosum, a shrinking of the papillæ, and disappearance of the sebaceous and sudoriferous glands.

The SYMPTOMS are not always characteristic until the disease is well advanced. Pruritus, local pain, and a tendency to crack and bleed upon coitus or slight traumatism are the most noticeable. The surface is usually dry, although a slight yellowish discharge may be present in the beginning. The progress is slow, but steady.

The only satisfactory TREATMENT is excision of the parts. Applications of strong carbolic acid have been used with temporary benefit.

The disease has been considered as essentially the same as trachoma of the eye. Good results are reported from the use of a spray of peroxide of hydrogen to cleanse the parts, followed by the

application of an ointment containing from 1 to 3 per cent. of the yellow oxide of mercury twice weekly by means of a speculum, the patient to apply the ointment twice daily externally.

#### IMPERFORATE HYMEN.

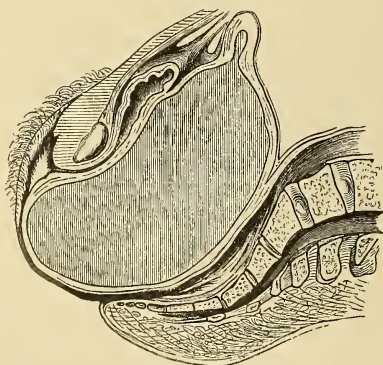
As the symptoms of imperforate hymen are the same as in many cases of atresia of the vagina, it will be appropriate to consider both of the affections under the latter heading.

#### ATRESIA OF THE VAGINA.

Atresia of the vagina may be congenital or acquired, and may involve any part or all of the vagina from the hymen to the cervix.

CAUSES.—The congenital variety arises from inflammation that has existed before birth, causing adhesion of the mucous surfaces of the hymen or vagina. After birth it may be caused by septic or gangrenous vulvitis, or inflammation connected with diphtheria,

FIG. 65.

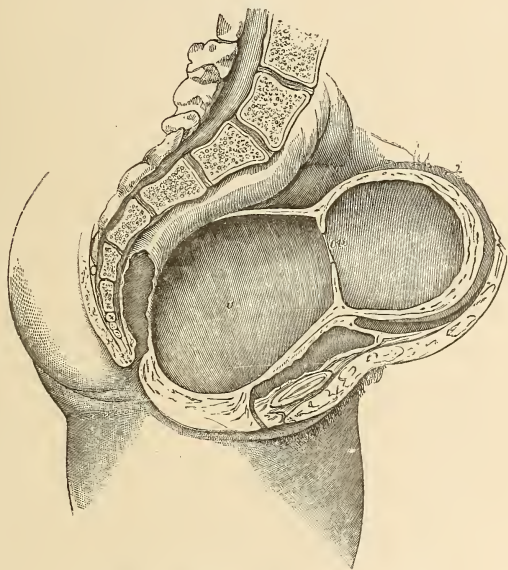


Atresia of the Hymen.

typhoid fever, scarlatina, or measles, or by destruction of the vaginal epithelium or walls, following the introduction of chemical or mechanical agents. In such cases either adhesion of the walls or cicatricial contraction in the ulcerated or sloughing parts occurs. Sloughing after labor, resulting in circumscribed or complete loss of the vaginal walls, is accountable for quite a large proportion of cases. Non-puerperal traumatism also enter as a causative factor.

VARIETIES.—The places of obstruction may be low down, consisting either of an imperforate or impervious hymen, or of the occlusion of the lower end of the vagina. The obstruction may be in the middle or upper portion or in different portions of the viscus, or it may involve the whole canal. Another variety consists in a double vagina and uterus, one side of which ends in a blind sac above the hymen. In many cases the condition is one of stenosis instead of complete obstruction.

FIG. 66.

Complete Occlusion of the Vagina: *v*, vagina; *ou*, uterus.

Complete or extensive congenital obstruction of the vagina is generally found in connection with deficient development of the uterus and ovaries.

COURSE.—Obstruction at or near the hymen may be accompanied by a retention of mucus in early life, and of the menstrual fluid in later life, particularly if the development of the uterus and ovaries has not been interfered with. The vagina becomes dilated and hypertrophied, and sometimes also the cervix, uterus, and Fallo-

pian tubes. These latter are more often dilated when the atresia involves the upper portion of the vagina, and in such cases pelvic peritonitis often ensues with adhesions, and occasionally rupture of the tubes.

When there is occlusion of the lower end of one side of a double vagina and uterus, the occluded side is most liable to burst into the other side, particularly through the cervical septum. The tissues then become infected, and develop into a pyokolpos or pyometra. The dilated Fallopian tube has also been observed to burst into the peritoneal cavity.

**SYMPTOMS.**—The deformity may be discovered in early life, but the symptoms do not usually appear until after puberty. Amenorrhea is, as a rule, the first. Recurrent menstrual pains are felt each month, but attention may not be called to the condition until the patient marries and finds copulation to be impossible. After considerable accumulation has taken place, pressure upon the bladder or rectum may cause pain in these organs and interfere with their normal action. Later, the symptoms of pelvic peritonitis, pelvic hemocele, or septicemia may be added, in connection with the development of hematosalpinx, and rupture of the uterus or tube, or of pyometra and pyosalpinx.

**DIAGNOSIS IN CASE OF IMPERFORATE HYMEN.**—Physical examination reveals an absence of the vaginal entrance and the presence of an elastic swelling under the pubic arch, which sooner or later can be detected over the pubes. Obscure fluctuation or a feeling of elastic continuity is then recognized if one hand be placed over the pubes and another upon the swelling below, whether from its vulval aspect or by rectal indigitation. The finger in the rectum recognizes an elastic globular tumor partially or completely filling the pelvis. A catheter in the urethra passes in front of the mass. There is but little tenderness of the parts except at the time of the menstrual pains.

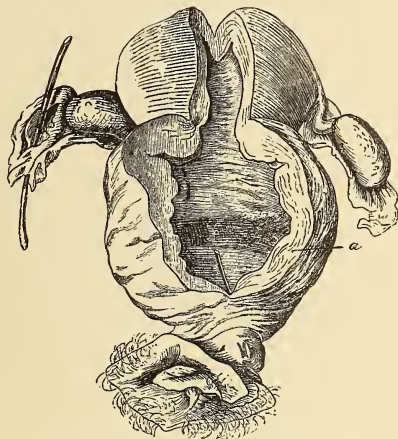
Stenosis, or incomplete obstruction, is known by the fact that an occasional escape of the menstrual fluid occurs. A careful examination, particularly under an anesthetic, will usually lead to the discovery of a small opening. The opening is sometimes found just under the urethra, pointing upward, and is most easily located by means of a fine bent probe.

Congenital atresia is nearly always discovered at or near puberty, if not earlier. The acquired forms often show some irregular con-



tractions or cicatrices due to past inflammation. Cicatrices are made more noticable by hooking a finger in the anus and putting the perineum on the stretch.

FIG. 67.



Hypertrophied Vaginal Walls above an Atresia of the Vagina.

Occlusion of the lower end of the vagina gives rise to the suprapubic tumor, but is not accompanied by the elastic vulval swelling. The finger in the rectum and the sound in the bladder enable us to feel just how far down toward the vulva the retention tumor reaches. When the whole vagina is occluded the bimanual rectal examination discovers the enlargement to be uterine and the vagina to be collapsed or in the form of a fibrous cord. When the occlusion is in the upper part of the vagina, its upper end is discovered by the same bimanual examination, and the lower end by the finger, or sound in the vagina introduced while the finger is still in the rectum.

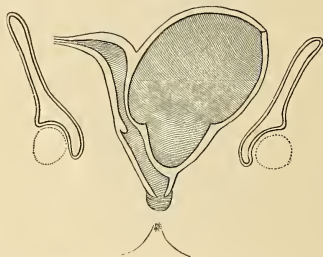
On account of the uterine enlargement it is difficult to recognize the dilated tubes, although an anesthetic will sometimes enable us to do so.

Occlusion of one side of a double vagina is not accompanied by amenorrhea. The other symptoms, as well as the signs obtained by rectal and abdominal examination, are much the same as in



cases of single vagina. The finger in the vagina, however, discovers a rounded tumor projecting into it from one side, and so flattening the cervix as to render the os somewhat crescentic in shape, with the concavity toward the affected side. If the tumor be aspirated from the vagina, a tarry fluid will be withdrawn, proving its nature. When there has been a perforation in the cervical region, pyocolpos and pyometra will usually have resulted. The tumor is less firm, and pressure upon it generally causes pus to flow into and out of the vagina. There will be septic symptoms, with occasional discharges of pus *per vaginam*, giving

FIG. 68.



Septate Uterus and Double Vagina, with Retention of Menstrual Fluid on the Left Side.

temporary relief. If rupture of the septum does not occur, the mass may finally project through the vulva and give the appearance of a prolapse of the vagina or a cyst of the vaginal wall.

PROGNOSIS.—Without interference the prognosis is, as a rule, bad. Dilatation of the uterus and Fallopian tubes, with pelvic peritonitis and adhesions, and occasionally rupture of the Fallopian tubes, pelvic hemocele, and even death, follow. Distortion of the organs concerned, with permanent destruction of their functions, is the rule when interference is delayed. Bursting externally, excepting in the cases of double vagina, seldom occurs, and even then only after irremediable damage is done to the organs of procreation.

TREATMENT.—The only rational treatment consists in evacuation of the fluid, and this should be done as early as possible after its discovery. The danger connected with the operation is threefold—viz. (1) danger of intraperitoneal rupture of a dilated and adherent Fallopian tube, as the vagina contracts; (2) of sepsis due to infec-

tion of the contents through the opening made; and (3) of injury of the bladder and rectum during the operation.

In cases of occlusion at or near the hymen, in which the accumulation is only recent, the second danger—viz. sepsis—is the only one to be feared. When the accumulation is of long standing and forms a large suprapubic tumor, the first danger—viz. rupture of a Fallopian tube—is to be guarded against. The best way is to make a small opening into the mass and allow the contents to flow away gradually, taking from one to two or three hours; then to enlarge the opening by a crucial incision and wash out the sac with a great quantity of sterilized saline solution ( $\frac{1}{2}$  of 1 per cent.), and pack the vagina loosely with iodoform gauze. In no instance should a long time elapse between opening and cleaning out, for fear of serious or fatal septicemia. Aseptic and antiseptic precautions must be observed throughout.

The gauze should be removed in twenty-four hours, and the cavity thoroughly washed out with a mild antiseptic solution, such as a 1 per cent. carbolic-acid solution, twice daily. The tendency to contraction of the opening may be combated by having the patient wear a glass plug part of the time.

When the atresia is higher up in the vagina, all three of the dangers above mentioned are to be guarded against. It is necessary to dissect with the scalpel and finger, using the latter as much as possible between the bladder and rectum toward the tumor. A finger should be kept in the rectum as much of the time as possible for a guide, and the bladder held out of the way by a catheter or sound. As soon as the tumor is felt through the new opening, a trocar should be pushed into it, and the contents allowed to ooze out very slowly, the opening being then enlarged by small cuts with a probe-pointed bistoury and moderate stretching with the finger.

Puncture through the rectum or bladder may be resorted to when it is impossible to operate safely by way of the vagina, but these are makeshift methods attended with danger from sepsis, and should be resorted to only in case of absolute necessity. They are, however, preferable to a let-alone policy.

Retention in one side of a double vagina should be treated on the same principles as the varieties already mentioned. The evacuation should be provided for through the vaginal septum. Excision of a portion or all of the septum is the surest way of effecting a complete cure.

## VAGINITIS.

The vaginal membrane partakes more of the character of skin than of mucous membrane. On account of its protected situation the horny layer is not well developed, except in some cases in which the membrane protrudes continuously through the vulva. At the upper end, however, it partakes a little more of the character of mucous membrane, in that it here contains a few muciparous glands. This dermoid character enables it, in its normal state, to resist infection by the various pathogenic bacteria that enter it.

ETIOLOGY.—Any influence, however, which injures the vaginal epithelium, such as the long-continued friction of foreign bodies or chemically irritating secretions or injecta, diminishes or annihilates this resisting power. If accompanied by a lack of drainage and consequent accumulation of secretions, the microbes multiply, infection follows, and vaginitis finally results.

Irritation, instead of exciting inflammation, merely leads to an increase in the density of the epithelium, with increased resisting power, as is the case with cutaneous irritation. Even a local loss of epithelium is not accompanied by an extension of the inflammation, provided the secretions find a ready outlet or are kept washed out.

Disordered states of the general system, such as anemia, chlorosis, indigestion, constipation, and conditions which tend to produce unhealthy conditions of the skin, predispose to vaginitis. Pregnancy, abdominal tumors, and any condition that produces pelvic congestion, whether venous or arterial, may also be considered as predisposing causes, and are to be taken into account in the treatment. Pregnancy acts both by producing venous congestion and oedema and by increasing the activity of the secretions. Secretions retained by a tight hymen may become infected and overcome the resistance of the pavement epithelium. Pin-worms, masturbation, and other causes of uncleanness may have a similar effect. Pathogenic secretions from the uterus, urethra, vulva, or introduced from without are frequent causes. Gonorrheal pus is undoubtedly the most common cause in adults. That the vagina of the adult may become infected it is necessary that the epithelium have suffered injury or that stagnant secretions remain in contact a long time. In children and old people infection takes place more easily. Inflammatory action and infection may also be spread by contiguity of surface from the cervix or vulva.

The exanthemata are held accountable for a small share of the cases.

VARIETIES.—Vaginitis may conveniently be considered under the following heads: Simple, Gonorrheal, Granular, Adhesive, Emphysematous, Vesicular, and Cystic.

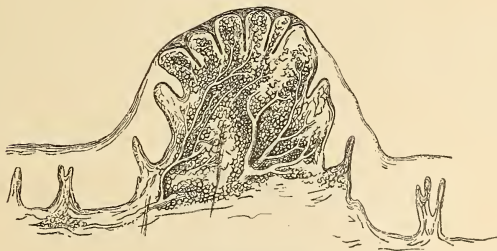
FIG. 69.



Simple Vaginitis.

**PATHOLOGY.**—*Simple* and *Gonorrheal Vaginitis* in the *acute* form present the following changes: hyperemia, with redness, dryness, and swelling of the papillæ; serous secretion, rapidly becoming purulent; small-celled infiltration of the epithelial structure; and some shedding of epithelial cells. If the disease lasts for some time, the deeper layers may become infiltrated, with loss of epithelium in places. In the beginning the changes may be confined to isolated spots. When caused by chemical irritants, such as

FIG. 70.



Granular Vaginitis.

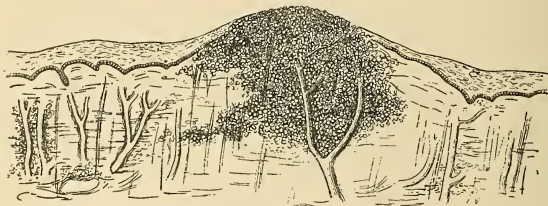
strong solutions of iodine, a sort of vesication may occur, with exfoliation of large layers of epithelial tissue looking like false membrane. As the vaginal epithelium has the power of resisting the invasion of the gonococcus, gonorrheal vaginitis is a comparatively rare affection in adults.

In the severer cases, and particularly acute attacks engrafted

upon chronic inflammation, in the hyperemia dependent upon pregnancy, or other disturbing influences, the papillæ undergo the same changes, but to a greater degree. The epithelium is exfoliated, and the enlarged papillæ resemble a mass of granulations, giving rise to the name *Granular Vaginitis*.

In children and in old people, in whom the papillæ are smaller and the epithelial layer thinner, the inflammation is usually found more in patches, the secretion scanty, the surface smoother, and often ecchymotic in spots. The epithelium is shed in places and the surfaces may be glued together. We then have *Adhesive Vaginitis*.

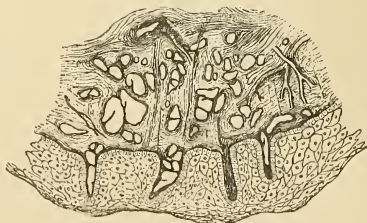
FIG. 71.



Adhesive Vaginitis.

*Emphysematous Vaginitis* is an inflammation of the vagina attended with development of gas in small spaces and canals of the connective tissue and lymphatics at the upper end of the vagina, and usually in pregnant women. They project like little bladders on a raised hyperemic base, and collapse when punctured. Desquamation or ulceration may result.

FIG. 72.



Emphysematous Vaginitis.

In *Vesicular Vaginitis* round vesicles form over the inflamed areas, and after bursting leave sharply-defined raw surfaces about the size of a split pea.



*Follicular Vaginitis*, consisting in enlarged inflamed follicles about the vaginal fornices, where the membranes may be supposed to possess more the character of a mucous membrane than lower down, is said to occur occasionally during pregnancy and in middle and advanced age. Whether the little nodules observed are really enlarged follicles or not is still a matter of controversy.

The older authors describe vaginitis as an inflammation of a mucous membrane, but the tendency now is to look upon it as more of the nature of a dermatitis, and thus some confusion as to nomenclature still exists.

**SYMPTOMS.**—In acute vaginitis the patient complains of a burning pain in the vagina, usually a frequent desire to urinate, with dysuria, and more or less itching and burning pain about the vaginal entrance. There is also a feeling of heaviness about the pelvis, backache, and a very slight rise of temperature. A general feeling of malaise, a loss of appetite, and perhaps nausea, are sometimes noticed; sometimes irritability and indications of hysteria, and sometimes no general symptoms whatever.

In the beginning there is a dryness of the parts, followed in a few hours by a sero-purulent discharge which tends to produce irritation externally.

In chronic cases the symptoms are similar, although less pronounced, and may be absent altogether.

**DIAGNOSIS.**—Upon inspection the vagina is found to be swollen and deeply reddened, either throughout or in spots, and presents the characteristics described in the paragraph upon the pathology. The discharge is white, pale green, or yellowish, and abundant, and may be thick and slimy in character from admixture with cervical mucus.

**PROGNOSIS.**—When promptly treated, the prognosis is decidedly favorable. When neglected, the consequences, particularly in the septic forms, are often serious. It may become chronic, result in ulceration, adhesion, cicatricial contraction, or spread to the uterus, Fallopian tubes, ovaries, and peritoneum.

**TREATMENT.**—The indications in the treatment of acute vaginitis are to avoid and to relieve irritation, and to secure cleanliness. The patient should be kept quiet (not necessarily in bed), somewhat restricted as to diet, and the stools kept soluble. Walking, sexual intercourse, and scratching the genitalia must be interdicted.

The great source of irritation is found in the infective matter and



the character of the discharges. These must be removed as completely as possible from contact with the vaginal membrane. Constant irrigation of the vagina would accomplish this, and, but for the trouble and irritation attending its use, would be recommended with the expectation of curing the case (if treated in the beginning) in from two to six days. A copious vaginal douche, continued for fifteen minutes, of a hot ( $\frac{1}{2}$  of 1 per cent.) saline solution or saturated solution of boracic acid, used in the recumbent position every two hours by day and every four hours by night, answers equally well, except that it may take longer to accomplish the desired result. It should be kept up in this way for a week, and used four times a day and once at night for another week or until a cure is obtained. If the disease has lasted several days, as is often the case, before the treatment is commenced, a mild antiseptic or astringent douche may be required during the second and third week, such as 1 : 3000 solution of mercuric bichloride, a  $\frac{1}{2}$  of 1 per cent. solution of acetate of lead, sulphate of zinc, or carbolic acid. If the disease shows a tendency to become chronic, the strength of the solution may be doubled. In no instance should an astringent vaginal injection be used during the first few days of acute vaginitis.

In cases in which so much douching is not well tolerated or is not available, the disease can rapidly be cured by the dry pack, used as follows: The vagina is first thoroughly douched out with the saline solution. Then the patient is put on the left side, a Sims speculum is introduced, and the cervix and vagina thoroughly swabbed out with a 1 : 2000 solution of mercuric bichloride and thoroughly dried with absorbent cotton. If the vagina be excessively tender, the bichloride solution need not be used, for it is necessary to avoid irritation. After drying out the parts the vagina should loosely be packed with sterilized plain or borated absorbent cotton, packing first the fornices and then the lower parts of the canal as the speculum is withdrawn. A dry absorbent dressing should be worn over the vulva and changed by the patient every two hours. The douching, disinfection, and packing should be repeated morning, noon, and night for the first two or three days, and after that twice a day for a week. As a precaution against return, a 1 per cent. carbolic-acid douche, or, if not well borne, the saline or boracic-acid solution, should be used every eight hours for a week or two longer. Attention should be given

to septic urethral or cervical discharges, or the vagina may constantly become reinfected.

Rectal suppositories or medication should carefully be avoided, as there is danger of infecting the bowel. In case such infection occurs, the rectum should be washed out thoroughly every three or four hours with the saline solution by means of a return tube. Forcible dilatation of the sphincter adds to the efficiency of the treatment. The bowels should be moved once or twice daily by salines.

Morphia with atropia, or chloral may be required in nervous patients to secure quiet and sleep at night.

In *chronic* cases attention should be given to general conditions that might favor the local irritation, to external sources of irritation, and especially to conditions that favor pelvic congestion, whether they lie within the body or in the habits and external surroundings.

Large antiseptic douches, such as 1 : 2000 bichloride of mercury, should be used two or three times daily. Every four to six days the vaginal fornices may be swabbed out with a 2 per cent. solution of nitrate of silver or the undiluted tincture of iron, and a loose vaginal tampon covered with vaseline left for twenty-four hours. Treatment by dry powders, such as equal parts of subnitrate of bismuth and prepared chalk, or of tannin and iodoform, kept in place by a cotton tampon, is used by some gynecologists. The powder should be renewed every day, having the tampon removed and the old powder thoroughly douched out just before the treatment.

In the senile and vesicular forms mild antiseptic douches are indicated, supplemented by strips of lint soaked in 5 per cent. carbolized oil or glycerin or smeared with 5 per cent. carbolized oxide-of-zinc ointment, or, in sensitive cases, of cold cream or almond oil kept in the vagina.

In giving douches for vaginitis it should be remembered that there are many folds and irregularities that hide and retain the secretions; hence it is well to have the patient lie on the back with the hips elevated on the bed-pan, so that the vagina will be well filled. The bag of the fountain syringe should be considerably higher than the patient and the nozzle introduced well up toward the fornices. Tampons are best placed with the patient in the knee-chest position.

Cystic vaginitis is best treated by puncture of the small cysts

about the cervix, and the application, after their evacuation, of the tincture of iodine. A vaginal douche of a 1:2000 solution of mercuric bichloride should be used twice daily.

In hospital practice, where there is always some one in attendance to give the douche, a bulb is preferable to a fountain syringe because the water can be pumped into the vagina with more force, and thus dislodges the secretions better.

#### NEOPLASMS OF THE VAGINA.

*Vaginal Cysts.*—Vaginal cysts, excluding cystic vaginitis, are sacs of fluid contained in or just beneath the vaginal wall, varying from the size of a marble to an egg, although if not interfered with they may attain a much larger size. The fluid is usually thin and transparent, but occasionally slightly viscid and turbid. The cyst-wall is intimately connected with the surrounding tissues and usually lined with cylindrical epithelium. Pavement epithelium has been found in a few cases. The cysts may be situated in any part of the vagina and occasionally assume a polypoid character.

Recent investigators attribute them to an embryonal origin. Accumulations of fluid in the partly-obliterated canals of Gaertner or ducts of Müller, particularly the former, are supposed to produce them.

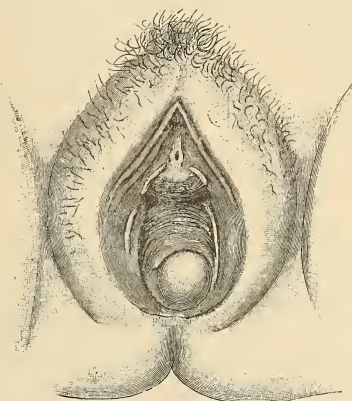
They give rise to but few symptoms until they have attained sufficient size to press upon the vaginal entrance and cause a sense of discomfort and pressure, and perhaps some leucorrhea. They may then assume the appearance of a prolapse of the vaginal wall. Where a prolapse is in process of formation, a vaginal cyst may go far toward determining the result.

The DIAGNOSIS is easy. When on the lateral vaginal walls, they are felt as hard elastic bodies that yield a thin transparent fluid upon aspiration. When situated upon the anterior wall, they may be recognized by putting a sound in the bladder and a finger in the vagina; or when on the posterior vaginal wall, by the forefinger in the rectum and the thumb in the vagina.

The TREATMENT consists in excising a part or the whole of the cyst-wall. When situated low down, they can easily be dissected out of their bed and the wound sewed up with buried catgut sutures. When situated higher up and complete excision is impossible, a portion of the cyst-wall should be excised, the remains painted with tincture of iodine, and packed with iodoform gauze.

*Fibroid Tumors of the Vagina.*—Fibrous and myomatous tumors seldom grow from the vaginal walls. True fibro-myomas, however, are not infrequently met with. They may be situated in the vaginal walls the same as vaginal cysts and of the same size, or they may become pediculated. They present the same symptoms and feel much the same as the cysts, except that they are not as elastic, and they do not yield fluid to the aspirating needle. As they grow larger the surface may ulcerate, or as a polypoid fibroid is extruded from the vulva the capsule may undergo necrosis. Sometimes they are quite œdematous and soft.

FIG. 73.



Cyst of the Posterior Vaginal Wall.

The polypoid growths may simply be cut off and the pedicle ligatured if necessary. The intramural tumors should be enucleated and the bed sewed up, as after excision of a vaginal cyst.

#### PAPILLARY EXCRESCENCES.

Small papillary growths of non-malignant character are sometimes found on the inflamed vaginal mucous membrane. They consist of a proliferation of connective tissue and epithelium. They are insensitive, but give rise to an irritating and somewhat offensive discharge. Sometimes they bleed quite profusely.

They should be obliterated by a strong astringent or caustic application and the vaginitis treated by the ordinary remedies.

## INFLAMMATORY DISEASES OF THE UTERUS.

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ANATOMY.—It is essential to a proper understanding of the various forms of endometritis that a short description of the anatomy of the endometrium be given. The internal os fairly well divides the lining membrane of the uterus into two very different and dissimilar portions. The corporal endometrium begins here, lines the whole inside of the body of the organ, and extends, modified, into the openings of the Fallopian tubes. Its characteristic features are these: it is firmly attached to the muscular tissue by a stroma of connective tissue. From this latter radiates in no certain arrangement a fibrillar tissue, which is found in lymphoid struc-

FIG. 74.



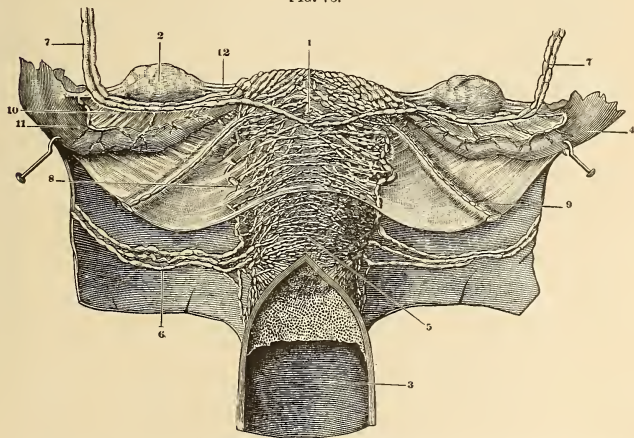
Fibre of the Endometrium, showing different grades of corpuscular development.

tures only. Attached to these delicate bands and between them are innumerable lymphoid cells of various sizes. This arrangement persists throughout the membrane up to the epithelial covering. This covering is of cylindrical cells, ciliated, but one layer in thick-



ness, and lines the utricular glands. These latter are merely deep depressions, with perhaps branches dipping down into the lymphoid tissue. (See Fig. 28.) There are also lymph-spaces in the mucosa. They extend from the mucosa to the spaces between the bundles of muscular fibres. The lymph-vessels are most abundant in the external muscular layer, are connected with the lymph-vessels of the mucosa and serosa, and run into large canals at the side of the uterus. The serosa has lymph-vessels only, arranged in a network, and, while less numerous than those in the subserous tissue, they are much larger. Thus the lymph passes from the mucous membrane lymph-spaces into the spaces and vessels of the muscularis, surrounds all the muscular bundles here, up to the serous coat, *and then passes into large tubes in the broad ligaments.* The uterine mucosa is, then, either an open lymphatic gland or a lymphatic surface intersected by blood-vessels, the lymphatics being not mere vessels, but spaces between the bundles of connective tissue.

FIG. 75.



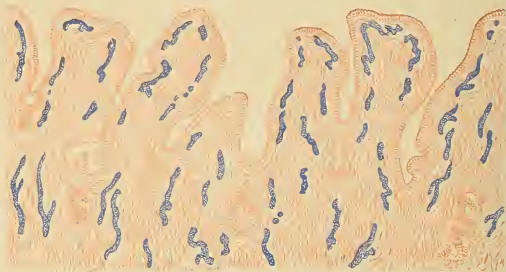
**Lymphatics of the Uterus:** 1, lymphatics from the body and fundus of the uterus; 2, ovary; 3, vagina; 4, Fallopian tube; 5, lymphatics from the cervix; 6, lymphatic vessels from the cervix going to the iliac ganglia; 7, lymphatic vessels from the body and fundus going to the lumbar ganglia; 8, anastomosis of cervical and uterine vessels; 9, small lymphatic vessel in the round ligament going to the inguinal glands; 10, 11, lymphatic vessels of the tubes which empty into the large lymphatic vessels from the body of the uterus; 12, ovarian ligament.

The mucous membrane of the cervix is dense, hard, free from lymphoid elements, and is a true mucous membrane. It rests on a



submucous structure of connective tissue. The glands are numerous and of the compound racemose type. The membrane is thrown into interlacing folds (*arbor vitæ*), and is covered by a columnar epithelium, in places ciliated, but on its vaginal aspect the covering

FIG. 76.



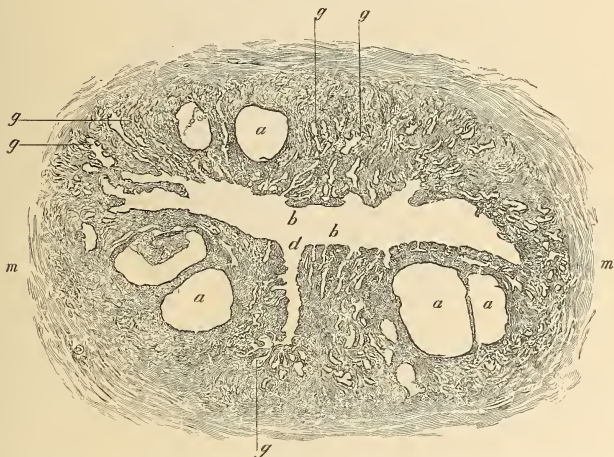
**Normal Mucous Membrane of the Cervix.** The mucous membrane of the Cervix is very firm and presents a number of branching folds (*arbor vitæ*). The interglandular tissue, which has, in the body of the organ, the nature of granulation tissue, is here of a connective-tissue type, the fusiform and stellate cells predominating. There is not the same clear limit between membrane and muscular coat: one can follow the glands deeply inward, among the connective-tissue bands, which separate the muscular bundles. Consequently the mucous membrane in section has a partly reticulated, partly fasciculated appearance. The cervical membrane possesses, moreover, many vascular papillæ. Cylindrical ciliated epithelium invests the glands in the adult, and in the child extends to the external os. In the adult, especially after pregnancy, the flat vaginal epithelium rises higher and lies more or less within the cervix. Between the superficial cylindrical epithelium and the glands, cup-shaped and colloid cells are here and there present. The vessels pass into the mucous membrane perpendicularly and have very thick walls, dividing progressively into a capillary plexus, which is less developed than in the body. Sometimes the capillaries lie very superficially under the epithelium, reuniting to form veins, which at once leave the mucous membrane. The glands and ovula Nabothi are surrounded by the vessels.

is of squamous epithelium. The lymphatics of the cervix are not so numerous as in the body, and do not enter the broad ligaments, but, joined by those from the upper part of the vagina, pass backward to the iliac glands and those in the obturator space.

**PHYSIOLOGY.**—A certain force, the origin of which is not known, operating through the vaso-motor nervous system, causes periodically an increased flow of blood to the uterus, producing thereby a wonderful series of changes. These consist of a great increase in the number of lymphoid elements in the mucosa, exfoliation of the epithelium covering the membrane and part of that lining the follicles, and rupture of the capillaries. Thus is produced the menstrual flow. The circulatory pressure subsides, the capillaries heal, a new epithelial covering to the surface and glands is produced, and the excess of lymphoid cells is absorbed, this repair and waste occurring once in the month. There is no exfoliation of the mucosa, and the above changes are limited to the corporeal endometrium. The follicles of

the uterus secrete a more or less milky fluid, somewhat viscid, alkaline in reaction, and free from pathogenic germs. Normally this secretion from the utricular follicles is so slight as not to be noticeable. The uterine secretion contains germs of no kind. It is similar in this respect to the gastric secretions. The glands of the cervix secrete in abundance a tenacious mucus. Germs are constantly present in the cervix. The cervix is solely for the purpose of acting as a sphincter to the uterine muscle, and its membrane is not involved in the menstrual act. Its secretion is clear, like white of egg, very tenacious, and abundant.

FIG. 77.



Transverse Section through the Upper Part of the Cervix, showing the Entire Mucous Membrane. The Central Cavity is the cervical canal: *b, b*, Internal Surface of mucous membrane, presenting small folds, superficial glandular depressions, and large incisions of the arbor vita; (*d*); *g, g*, deep glands; *a, a*, ovules of Naboth; *m, m*, muscular tissue of the uterine wall.

The endometrium is solely for the purpose of forming the decidua.

Menstruation is merely that, periodically, the uterus gets into a condition more propitious for conception than at other times. The menstrual blood escapes, as it does in apes, because the uterine mucosa is of such dense character, compared to that of other animals, that its lymph-streams are not of sufficient size to carry off all the products of the monthly engorgement.

The escape of an ovule, exfoliation of the epithelium from the surface of the endometrium, engorgement of the endometrium with

blood, and multiplication of lymphoid cells, are the factors which invariably are necessary on the part of the woman, that conception may take place.

The lymphoid cells produce the decidual cells, and, by them, reproduction of the mucosa is brought about, after its removal; lymphoid cells form also the new epithelial layer.

In the endometrium of the child there are few corpuscles, abundant fibrillar tissue, and the follicles are mere dimples. In the

FIG. 78.



Menstruating Endometrium of a Woman aged 20, showing Utricular Follicles denuded of Epithelium, with one still containing an Epithelial Cast.

fully-developed woman the corpuscles crowd the tissue and are of all sizes. The whole membrane appears to be made of them. The glands branch, dip deep into the lymphoid tissue, and are lined with cylindrical ciliated epithelium. In old women there is nothing left save fibrillar tissue, a few corpuscles, and wasted utricular follicles. Between these extremes may be found all gradations, and in the same uterus at different times the arrangement and condition of vessels, epithelium, glands, and corpuscles so vary as to constitute essentially a different organ, under the influence of the controlling factors, menstruation and gestation. Inflammatory processes, then, imposed upon these widely dissimilar states, furnish a great variety of pathological appearances, and will culminate in some one of a great variety of microscopic changes. There-

fore, we must not expect every inflamed uterine mucosa examined to exhibit characteristics identical with some known standard. As

FIG. 79.



Endometrium of a Woman aged 60, showing Exhaustion of the Whole Structure.

the conditions under which inflammation may occur are many, so must be the pathological changes.

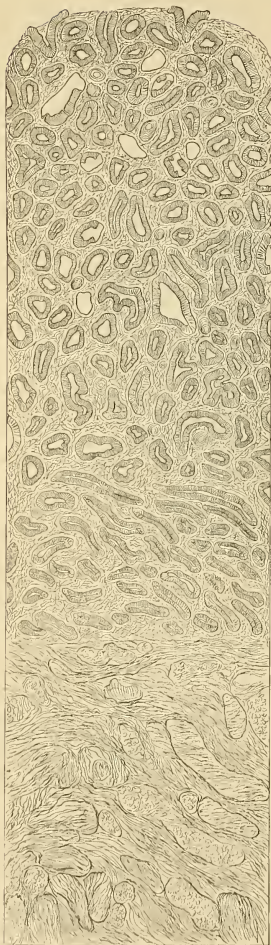
### ENDOMETRITIS.

Inflammation of the endometrium should be considered from the standpoint of its etiology, and, inasmuch as the treatment is largely governed by the causation, classification according to the latter is eminently proper. Therefore endometritis may be described as simple, septic, or specific. Descriptions of endometritis based upon the symptomatology and classed by authors as hemorrhagic, hyperplastic, etc., are confusing, and are merely different phases of the same pathological condition.

**SIMPLE ENDOMETRITIS.**—This is usually symptomatic and never acute. The membrane may be hypertrophied or atrophied. In the *first condition* the follicles are many-branched and tortuous with thickened epithelium, which is still deposited in one regular layer. The vessels are enlarged and increased in number; the lymph-spaces are increased in size, and the muscular walls thickened. The epithelium is easily brushed off, causing bleeding; the spaces about the follicles are filled with lymphoid cells, and the



FIG. 80.



Benign Adenomatous Degeneration or Hypertrophic Glandular Endometritis.

whole general aspect is one of increased growth and excess of nutrient fluid. Should there be an increase of connective tissue and accompanying glandular hypertrophy, the condition known as "fungoid" is produced. Here the fungoid elevations are cystic and lined by cuboidal epithelium. After abortions portions of decidua may remain adherent; this is not a true product of inflammation, but rather the growth of a tissue which has partly retrograded. Hypertrophic simple endometritis is usually found associated with those lesions which are pre-eminently characterized by a general enlargement of the uterus, as in retroposition, fibroid, subinvolution, etc.; or, glandular hypertrophy may occur, producing mucus polypi.

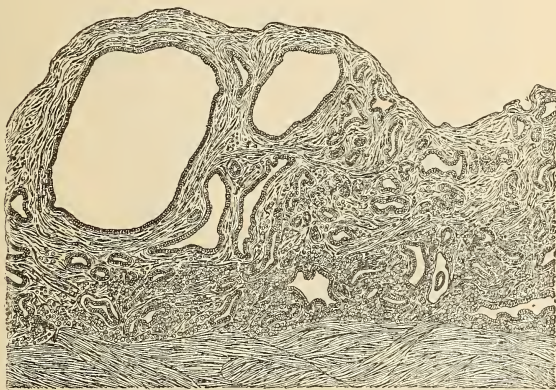
These polypi hang by a longer or shorter pedicle, and may even project from the cervix, although attached above the os internum. When they touch the os internum the cervix will be dilated and patulous, or even gaping open.

If the membrane be *atrophied*, the follicles with their epithelial linings are decreased in size, the lymphoid tissue is not so rich in cells, and the whole membrane is below the normal in thickness. There is an abrupt demarcation

between the mucosa and the muscularis, and no intermingling of these structures. There may, in very chronic cases, be so great an increase in the connective tissue

as to destroy every vestige of gland-tissues, or, constricting certain glands, cysts may be formed. This form of interstitial change is rare except in old women, but is very similar to alterations produced by zinc-chloride and nitric-acid applications. Simple ante-flexion and non-development are the chief causative factors in the condition of atrophic endometritis. The blood escaping at the menses readily coagulates, owing to the scarcity of lymphoid elements; the epithelium, instead of melting off gradually, separates in shreds or even as a whole cast. No micro-organisms are found, save, occasionally, secondary tubercle bacilli. Altered circu-

FIG. 81.



Glandular Endometritis; Polypoid Form.

lation by position or flexure, and consequently perverted local nerve-function, are the chief elements entering into the causation of these two very common conditions of the endometrium. They can scarcely be considered as truly inflammatory, but may at any time become actively so.

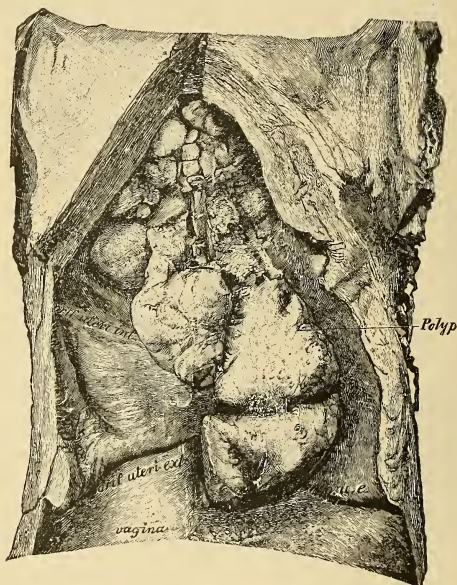
This glandular endometritis when forming distinct elevations or fungosities constitutes the condition known as "benign adenoma." The only adenoma from the uterine mucosa is adeno-carcinoma, or, in plain words, cancer.

In all forms of inflammation of the endometrium the epithelial cells are deposited in but one regular row of single cells—never in layers. Beginning cancer may be differentiated by



three things: the glands are not only increased in number, but are many times larger than the normal; the epithelium lies in layers; and the epithelial elements invade the subjacent tissues later on.

FIG. 82.



Diffuse Papillary Adenoma of the Body of the Uterus with Polypi.

Therefore, when examining curette scrapings, unless they present but one thickness of epithelium arranged about the glands as one regular layer, the case must be looked upon with suspicion.

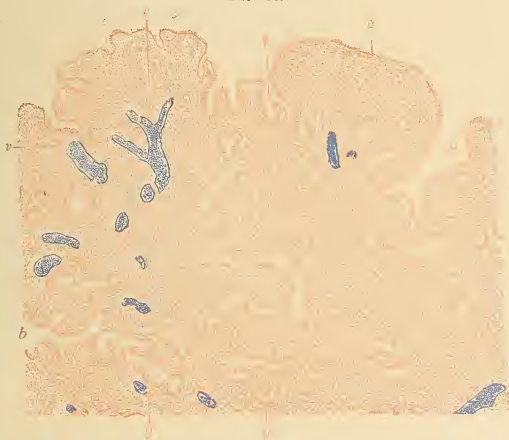
**SYMPTOMS.**—When the membrane is *hypertrophied*, in addition to the symptoms of the causative lesion, we have certain definite ones due to the hypertrophy alone. The menses are increased in amount, sometimes painful; the flow dark, clotted, or clear. There may also be intermenstrual bleedings. Bimanual examination reveals the gross lesion causing the condition. The sound readily produces bleeding, and frequently develops at the internal os a point of exquisite sensitiveness. The depth of the organ is increased.

The cervical flow of mucus is tenacious and usually milky in character, owing to the excessive admixture of epithelium and lymphoid cells. There is no erosion of the cervix, and the cervical membrane is not often coincidently inflamed. Menstruation is followed by a more or less persistent leucorrhœa.

When the hypertrophy has gone on to the production of fungosities, increased menses, intermenstrual bleedings, and a profuse leucorrhœa, often purulent, are the characteristic symptoms. The same is true when portions of decidual tissue have been retained and grown to the endometrium, thus forming buds and excrescences.

With a less degree of hypertrophy the chyle-like fluid (leucor-

FIG. 83.



Section of a Glandular Uterine Polypus: *a, a*, superficial nodules covered with cylindrical epithelium; *b*, mouth of glands opening into a depression between; *g*, deeper portions of the same glands; *v, v*, blood-vessel.

rhea) is non-irritating and devoid of germ-life. It is composed of increased secretion, fat-globules, lymphoid cells and epithelium, and has no odor.

With polypi the amount of hemorrhage produced is often so great as to suggest fibroid; and even a very small polypus may give rise to alarming floodings. The uterus always treats these growths as foreign bodies, the cervix remaining patulous and soft, and the uterine muscle making ineffectual spasmodic, attempts at expulsion of the growth, especially at the menses. Besides the

intermenstrual bleedings, there may be a more or less continuous discharge of dark, coffee-colored fluid suggestive of malignant disease. There can be no question that these polypoid granules, although in the beginning perfectly innocent, will, if allowed to remain for years, take on the characteristics of malignancy, in that their epithelial elements will invade the surrounding tissues.

Always there is more or less of a purulent leucorrhea, due to

FIG. 84.



Interstitial Endometritis with complete Atrophy of the Glands: A, cystic formation, last trace of the glands; B, all vestige of gland-tissue disappeared.

colonies of cocci becoming established upon the generally abraded surface of the polypi. The rest of the endometrium may remain free from the pathogenic germs.

Often it is impossible, without intra-uterine touch, to distinguish polypoid endometritis from corporal cancer. The character of the growth determined by the microscope will enable us to differentiate absolutely.

Where the membrane is *atrophied* the dysmenorrhea is often excessive. This pain precedes the flow by a few hours, is located just behind the symphysis, and is intermittent, alternating with the escape of clots. The flow is scanty or watery. There is also a slight leucorrhea. In both conditions there are digestive disturb-

ances and reflex nervous phenomena entirely disproportionate to the changes in the endometrium. Backache opposite the last lumbar vertebra, "*bearing-down*," and a sense of weight more often accompany the hypertrophic form. Sterility results from the atrophic variety more frequently, and is directly dependent upon the altered state of the endometrium.

**TREATMENT.**—In no form of uterine disease is general treatment of so much benefit. It may even cure certain cases. Thus, a change of climate, the "*rest-cure*," and an out-door life, may determine such alterations in the general nutritive functions, as to relieve these patients of most symptoms. It is in these cases of chronic simple endometritis that the various springs and watering-places are of benefit, the general surroundings and change in mode of life accomplishing the improvement, by acting through the general absorptive system. The small quantity of arsenic and iron in the waters has but little effect. The dysmenorrhea and excessive flow are lessened by cannabis indica, gelsemium and hydrastis. When the mucosa is much hypertrophied, producing fungosities or polypi, with hemorrhages, the proper treatment is always to remove the entire endometrium, and, if possible, correct the lesion upon which the endometritis depends. This should be done surgically, and not by the use of powerful chemical agents. If the gynecic surgeon will keep clearly before him the fact, that there is but a little tissue between the endometrium and peritoneum, rich in connecting blood-vessels and lymph-streams, if he will view endometritis from the peritoneal rather than the vaginal aspect, he can make no error in choosing the proper method of treatment. Although the inside of the uterus, in these cases, is free from micro-organisms, yet they are in the vagina. To treat patients by zinc chloride, carbolic acid, electricity or other escharotics, is to produce a more or less extensive slough, retained to become putrid, and is to create a surface deprived of that protecting epithelial covering which is the organ's sole defence against the inroads of pathogenic germs: and they do this in an unclean way, with no provision for drainage. The hypertrophied membrane should be removed with the sharp curette, as will be described. Atrophic simple endometritis, and the hypertrophic variety when slight, can be relieved by removing the causative lesion and treating the endometrium by gauze packing. Drainage with stem pessaries, whether perforated or grooved, is a delusion. They do not drain, but are mischievous affairs, hard to keep open and clean. The

application of mild antiseptics and astringents to the endometrium thus inflamed is a perfectly proper procedure, but care must be exercised that with the application pyogenic cocci are not introduced. If the change in the endometrium does not warrant operative procedure, the vagina and cervix should be thoroughly cleansed, the cervix should be pulled down by bullet-forceps, a narrow strip of iodoformized gauze introduced into the uterus, and the vagina packed lightly with the same material. In two days this is changed and a larger piece of gauze introduced, the canal then being more patulous. When this gradual dilatation has gone so far as to ensure good drainage through an open canal, and there is hypertrophy of the uterus, intra-uterine astringents are used before introducing the gauze; tincture of iodine is the preferable drug for this purpose, applied by means of a cotton-wrapped applicator. It is not only astringent, but germicidal, and is moreover not deep in its effects; its action is limited to the superficial structures only, and therefore produces no slough. The patient is not kept in bed, but confined to her room. The treatment is not painful after the first few sittings, and the endometritis is often relieved in two weeks, though it will recur if the causative disease be not removed. The treatment should be begun a week after menstruation.

The treatment of endometritis by chloride-of-zinc pencils is still practised by a number of physicians in America and abroad. This procedure causes the exfoliation of the endometrium. It does this by destroying the membrane, which is cast off by suppuration, and a simple hypertrophic endometritis is converted into a septic process by its use; at the same time a septic metritis is set up, and salpingitis and peritonitis may follow the treatment. The pain it produces is severe. Nothing could be more unscientific than this practice. Even though curettage were a dangerous procedure, and the curette often thrust through the uterus, it could not produce the destructive lesions which zinc does. The same objections attach to the use of nitric acid. Not only is the treatment itself most painful, and prone to produce serious lesions, but it also leaves the uterus in a crippled condition. The new endometrium produced is atrophic, the uterus the seat of connective-tissue changes, and menstruation incomplete, attended by great pain due to tension, and hysterical manifestations. Even the chief advocates of the chloride-of-zinc treatment admit its dangers. It is certain that those



dangers are not to be avoided by any effort on the physician's part, but are inevitably inherent in the method.

Before making an application to the uterus the entire field of operation should be cleansed by a solution of lysol, 1 per cent., or of creolin, 2 per cent., scrubbing the vagina and cervix carefully with cotton pledgets held by forceps. An applicator is then wrapped with cotton and the cervical canal wiped with either of these two solutions or a carbolic-acid solution, 5 per cent., care being taken not to invade the inside of the uterus. If a probe is to be used, it should be heated in an alcohol flame to sterilize. The direction of the cervical canal having been determined by the probe, a very fine fillet of iodoform gauze, 20 per cent., is laid over the applicator, which has been curved to the shape of the canal and is pushed up to the fundus of the uterus. The applicator used for this purpose should be so rigid as not to bend when used. The uterus should always be drawn down gently and steadied by means of a bullet-forceps to straighten its canal. The ordinary tenacula prick the membrane, cause pain, and are followed by the discharge of a few drops of blood. To avoid this, a very coarse double tenaculum, made like the American bullet-forceps, the points being so dull that they do not penetrate the mucous membrane, may be used. A wad of iodoform gauze, the size of a silver dollar or larger, is then carefully adjusted over the cervix, and another of borated cotton is placed over this to retain it in place. Treated this way, no odor of iodoform is noticeable about the patient, and the field of operation is kept aseptic from one treatment to the other. It is useless to do this if the patients are allowed to have intercourse or douches, or if the vagina is in any way invaded. After the treatment they may go about their rooms, and should be perfectly comfortable. It is not to be forgotten that the condition which causes this change in the endometrium must be cured. Polypi, fungosities, and retained decidua tufts are to be removed by the curette; they are not amenable to palliative treatment. Iodine is not of much benefit in the atrophic form. These latter cases often prove intractable. If they be subjected to the gauze packing for the three weeks preceding the period, and the last dressing removed three days before the menses come on, it will be found that the flow is increased in quantity, is more nearly normal in character, and the pain less severe. The same treatment may be repeated the next, and if necessary the succeeding months. After the cervix has become so dilated that it



will receive a filament of gauze half the size of a lead pencil, one may rest content with the result. The uterus is not to be packed, but the gauze is gently introduced to the fundus. The cervix has the property of dilating around any foreign substance in its canal, and gauze packing of this size is amply sufficient to ensure good drainage. The results of the treatment are very satisfactory.

#### SEPTIC ENDOMETRITIS.

Septic endometritis is an infectious inflammation of the endometrium, usually caused by staphylococci, occasionally by streptococci. It may occur at any time of life and in any condition of the uterus, but it is most frequently seen during the menstrual life of the woman, being favored by that function and pregnancy. It may be chronic, but is most often seen as an acute affection. The pathology and symptoms will be modified by the condition of the uterus at the time of the attack. Infection of the post-partum uterus belongs more properly to the province of the obstetrician.

*Acute Septic Endometritis.*—Acute septic endometritis is caused in the greater number of cases by infection after abortion; cases, however, are caused by foul manipulations of the uterus, and operations upon that organ. Inasmuch as pyogenic germs are constant in the vagina auto-infection is possible under certain conditions but it must be exceedingly rare. Any factor which induces exfoliation of the epithelium, such as menstruation, abortion, rough treatment, sudden congestion, exposure to cold, and the introduction of infected instruments into the uterus, puts that organ into a condition propitious to the development of infection.

**PATHOLOGY.**—In the acute form the uterus is enlarged and engorged with blood. The mucosa is swollen, of a deep color, and the number of vessels actually increased. In spots it may be necrotic or the whole membrane may slough. The epithelium covering the membrane and lining the follicles is exfoliated to a greater or lesser extent, and the vessels present on the surface rupture, giving rise to capillary bleedings. Pus-cells cover the surface and fill the follicles; in aggravated cases they are found also in the lymphatics and lymphoid tissue. The muscularis is of a very deep color, softened and much thickened, even in a few hours. Its lymphatics are gorged with cocci, in advanced cases, and its blood-vessels with blood. True septic metritis is present. Staphylococci

are everywhere in the membrane, sometimes even penetrating the muscular walls. Rarely are streptococci found except in puerperal cases.

FIG. 85.



Puerperal Endometrium removed by Curettement on the Seventh Day: *a*, Necrotic layer of the decidua; *b*, zone of reaction; *c*, Sections of the glands; *d*, Sections of the blood-vessels; *e*, Remains of the glandular epithelium.

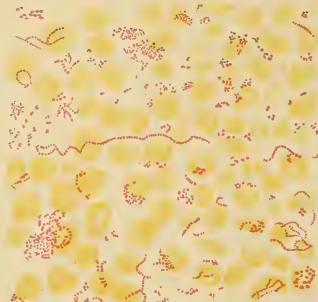
In *chronic septic endometritis* the same lesions occur, only to a less degree. There is a general reproduction of epithelium, and the more acute symptom, necrosis, is absent. Pus is produced in quantity in the glands and on the surface of the membrane. The cocci may have penetrated the muscular wall, and there formed a pus-focus even amounting to abscess. In doing this they follow the lymph-streams. Complications are most likely to accompany these conditions, and the changes due to pelvic lymphangitis, ovaritis, salpingitis, and peritonitis may be found.

Those cocci which are found present and arranged in groups are staphylococci, the germs always found in septic endometritis; those in chains are streptococci, which cause many cases of, and are found in, puerperal infection.

**SYMPTOMS.**—The acute stage is often ushered in by a chill, especially after abortion. This is followed by severe uterine colic, which soon becomes a continuous pain. The temperature rises to a variable degree, with rapid pulse. In a few hours the uterus discharges a greenish pus or one tinged with blood. The uterine pain is severe, and the patient keeps the bed. Examination reveals the uterus enlarged and very sensitive. The parts have increased heat.

From the cervix projects a rope of muco-pus, possibly bloody. If the disease has lasted a few days, the cervix is eroded, and may

FIG. 86.



Cocci from an Empyema; prepared by Gram's Method.

even be covered by a true diphtheritic membrane, the result of infection by streptococci. Some of the complications which follow this condition may be present and add to the symptoms. The acute symptoms may subside in a few days, provided the very common complications of peritonitis and salpingitis do not overshadow the symptoms of the endometritis. Thus the acute form may gradually become chronic, with few symptoms other than a little pain, "bearing-down," and a purulent leucorrhea. It is not always easy to discriminate a chronic simple endometritis from a chronic septic one, but in the latter there is the invariable clinical feature of purulent discharge from the uterus, which is not present in the former. This pus does not always appear in the cervical mucus, but it can often be obtained with the suction syringe, and it usually follows the withdrawal of the sound. The symptoms of gonorrheal endometritis are very similar to those of the septic variety. In some cases the microscope alone will differentiate the two forms, which are frequently blended. Whenever pus escapes from the uterus, it is an absolute indication that pyogenic cocci are in that organ, and clinically the case is either in a septic or specific state.

**TREATMENT.**—The radical treatment is the best: thorough and complete removal of the septic focus. Curettage, irrigation and gauze-packing are recommended, as these uterine inflammations must be considered in the light of their complications. Prompt interfer-

ence may cut short the disease, and save the patient those gross changes in the tubes and peritoneum which so often result from a neglected septic endometritis. If destructive disease of the adnexa has already taken place, the curettage is none the less indicated. The more acute the symptoms, the greater the indication for the operation. Some cases of chronic septic endometritis without complications *may* be cured without the use of the curette by the introduction of drains of iodoformized gauze, but this method must be pursued with the strictest attention to asepsis. The presence of a purulent uterine discharge positively contraindicates the use of applications and stem pessaries, unless the applications be accompanied by the use of the gauze drain. The best treatment, then, applicable to acute and chronic septic endometritis, when complicated by disease of the adnexa or peritoneum, is curettage. Whether the septic condition follows treatment, operation, or abortion, whether it accompanies cancer, polypi, fibroids, or other neoplasms, yet must the septic uterus be cleaned out before any other treatment is instituted. If infection follows plastic work on the cervix, the sutures should be removed, the uterus curetted and packed.

There are so many important minor details in the after-treatment of septic endometritis that they require separate attention. When a uterus not enlarged is curetted for an uncomplicated chronic inflammation, the gauze need not be removed for four days, and renewal is not necessary. In renewing the dressings infection is easier than at their first application, for the reason that the uterus is now divested of its protecting lining. Care should therefore be taken not to reinfect the case. The second vaginal dressing may remain from three to four days and then be removed. All interference with the vagina, in the shape of douching, coition, and examination, should be prohibited for the remainder of the month, and the patient must take to her bed on the appearance of menstruation.

When the curetting has been done on an enlarged uterus acutely infected, as after abortion—say at the third month—the dressing should first be changed on the third day; sooner if the temperature rises or other acute symptoms appear. Subsequent dressings are made whenever this one becomes saturated. After the uterus has become entirely clean, with non-purulent discharges, the use of ichthyol tampons is indicated, to overcome the existing subinvolution. This latter condition occasionally produces a simple hypertrophy of the

mucosa, which will, at the subsequent one or two periods, give rise to menorrhagia. The larger the uterus the longer the treatment must be continued. After the first dressing the packing is loosely placed. The treatment is not painful. The uterus is always to be steadied by using the blunt bullet-forceps, hooked into the anterior lip. After abortion at the third month, irrigation with boiled 1 per cent. salt-solution or 4 per cent. boric-acid solution is also employed at the dressings. Strong antiseptics should never be used. The larger the cavity the more elaborate the treatment. In other words, these infected uteri are treated exactly as other discharging septic cavities, only here drainage is more difficult to obtain.

*Gonorrheal Endometritis.*—Of all forms of virulent endometritis, this is one of the most common.

*PATHOLOGY.*—Acute gonorrheal endometritis presents the same gross lesions as the septic form. Microscopically, we find that the gonococci penetrate but little below the surface, and are chiefly found in and under the epithelium. They follow the lymph-streams to a less extent than the staphylococci. Again, there is pus produced in true gonorrheal endometritis, but sloughing never follows this form of infection. No case has yet been reported of fatal primary gonorrheal endometritis. Systemic infection is not as severe as in the septic form. The great complication is salpingitis, by direct tissue extension from the uterine tubes to the tubes. Chronic gonorrheal endometritis is very frequent, resulting from a subsidence of the acute form. Here the gonococci occupy the follicles and lie beneath the epithelium. They do not penetrate deeply into the mucosa, and do not extend along the lymph-spaces. Therefore they do not cause peritonitis and systemic infection except by extension through the tubes. Each menstrual period sees a greater or lesser increase in the invasion, and recurrent attacks of tubal disease are frequent.

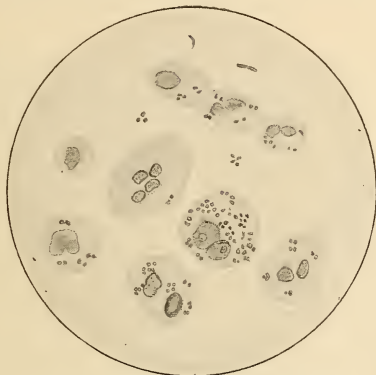
*SYMPTOMS.*—Possibly some one or all the symptoms of gonorrheal vaginitis or vulvitis are present, but they may all be absent, and the first and sole indication of infection may be the sudden onset of a virulent endometritis. There may be occasional rigors, fever, and great pain in the uterine tubes. The temperature does not at first range high, and the initiative chill is not prominent. The pain in the uterus is of long continuance, with exacerbations. In a few hours the discharge of muco-pus appears, often tinged with blood. If there be no extension of the infection, the symptoms



of profuse discharge, slight fever, and pain gradually subside in ten days or less, leaving behind merely the symptoms of chronic purulent endometritis.

The local symptoms are indential with those of septic endometritis, but gonococci are found in the discharges.

FIG. 87.



Gonococci in cells and between cells (from specimen).

Although these appear irregularly grouped in the pus-cells, yet on close inspection they may almost always be seen arranged in pairs (diplococci), the opposite surfaces of each pair being flattened like two Ds (DD) back to back. They may be in groups only, and not show this diplococcus arrangement. Their manner of staining will then prove their character.

**TREATMENT.**—If seen early and before the advent of any complication, local bloodletting should be obtained by puncturing the cervix in several places with a sharp bistoury, and then the uterus should be irrigated thoroughly with a saturated solution of boracic acid or a bichloride-of-mercury solution, 1:5000; after which a drain of iodoform gauze should be introduced and the vagina filled with the same material. In twelve hours both dressings may be removed, the uterus again irrigated, and more gauze inserted. This should be repeated several times daily. It is easier to subdue gonorrhoeal than septic endometritis. If the first attempts to control the disease fail, we may be sure that the infection is a mixed one,



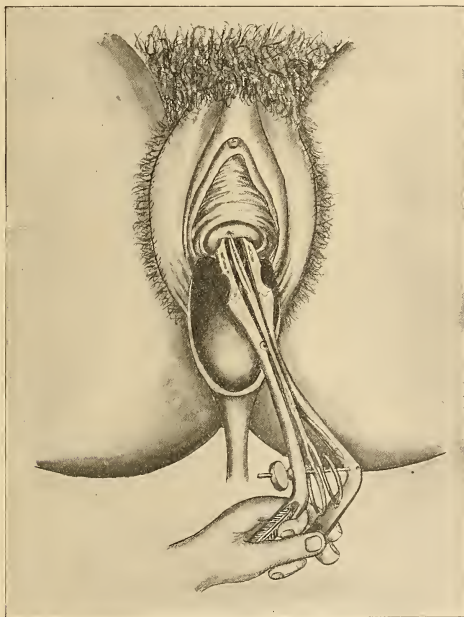
and the treatment should be that for septic endometritis. If there be the complication of salpingitis or peritonitis, the operation of curettage is necessary. The body of the uterus is not the natural habitat of the gonococci, as the endometrium has a pronounced resistant power against them; their home is in the cervix, the urethra, and vulvo-vaginal glands; therefore they invade the corpus uteri in but a small number of cases, otherwise infected.

#### CURETTAGE.

*Curettage of the Uterus.*—Admitting that in most cases pathogenic germs exist in the vagina and the cervical canal, the right does not lie with the surgeon to suppose the endometrium exempt in any given case of inflammation of the uterus. Therefore a method must be adopted which presumes they are present in all cases. The instruments necessary for performing a curettage are—a speculum, double tenaculum, heavy applicator, curettes, uterine dilator, fountain or bulb syringe, and an intra-uterine packer. The operation is best done with the patient in the lithotomy position and with Kelly's pad placed under the hips. The lithotomy position is preferable to Sims', as irrigation is easier, and at any stage of the operation a bimanual examination may be made. The solution for irrigation is preferably a saturated solution of boracic acid, but bichloride of mercury 1 : 4000, or even boiled salt-solution (7 : 1000), will answer. The vaginal canal and instruments should be sterilized (see Technique). Instead of sponges, swabs of cotton wet in bichloride-of-mercury solution are used. Any stiff dilator will answer the purpose, but those with screws should be employed carefully, for the blades are apt to tear the tissues, as the screw renders it impossible to relieve the pressure until too late. Goodell's instrument is a proper one. The vulva having been shaved, the patient cleansed and in position, the speculum is introduced and held by the assistant on the patient's right. The anterior lip of the cervix is seized with the double tenaculum, pulled down as far as desired, and given in charge of the same assistant, whose left hand rests on the pubic bones. In this way the uterus is held immovable. By bimanual palpation the size and position of the uterus are determined. The cervix should cautiously be dilated bilaterally, the grip relaxed, the dilator turned a little, and dilatation made in the new position of the instrument; in this way by alternately dilating around the entire circumference of the cervix the canal will readily

and safely be dilated to an inch or more. It must not be forgotten that we are working in undeveloped unstriped muscular fibre, to overcome the force of which too sudden pressure must not be used. Dilatation by graduated sounds is not advisable, inasmuch as the pressure is made against the hold of the tenaculum, and either insufficient dilatation is made or the tenaculum tears the tissues. Under any circumstances the traumatism induced is much greater

FIG. 88.



Instruments in Position for Dilatation of the Cervix Uteri.

than when the steel instrument is used as described. Besides, the dilatation obtained is not sufficient to destroy the action of the local sympathetics, upon which depends the uterine colic and the expulsion of the dressing, as observed and complained of by those who use the graduated sounds. After dilatation the uterus should be washed out by means of the small nozzle of the syringe, followed by the use of the curette. As large an instrument as can be

introduced should be used. Gently introducing the curette, it is withdrawn, its cutting face downward, and by reintroductions and withdrawals the whole organ is systematically scraped. The small size is then used if the uterus be firm, and the openings of the tubes and lateral angles scraped. The instrument is then turned so as to curette the fundus by a sweep from side to side. The danger from curettage lies not in the proper use of the instrument, but in introducing it roughly and with force. The instrument should be held as is a pencil, and used with a delicate touch. Blunt curettes are useless for this work. If a surgeon must use such because of the supposed

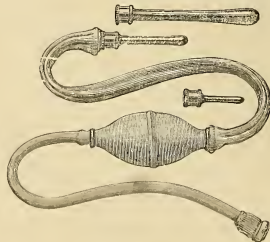
FIG. 89.



Sharp Curette.

danger attaching to the sharper instrument, it is questionable whether he should do the operation at all. Again—and this is important—the dull curette at best scrapes off only the epithelial and softer external portions of the mucosa and opens up the lymph-channels. Thus its use may be harmful; for if a septic infection be local, and the epithelium of the rest of the organ has sufficient resistant power against the cocci, the procedure but removes this sole protection against a general infection without going sufficiently deep to remove the cocci, and thus creates for the germs a new field for extension. So it is manifest that in septic cases, at least, the

FIG. 90.



Bulb Syringe.

fancied safety of the dull curette, apart from its inefficiency, is a delusion. The object of the operation is to remove the entire endometrium, so that the cytogenic embryonic uterus may produce a new one under propitious circumstances. Following the curet-

tage, the uterus is to be irrigated again thoroughly. If the organ is much hypertrophied, the entire cavity should be swabbed out with tincture of iodine on an applicator, or the application made by means of the intra-uterine syringe.

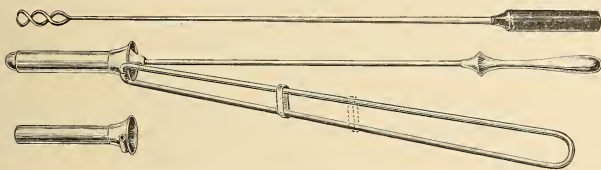
FIG. 91.



Braun's Intra-uterine Syringe.

**UTERINE TAMPONADE.**—The gauze is introduced in one long strip. If the cervix be thoroughly well open, the gauze may be

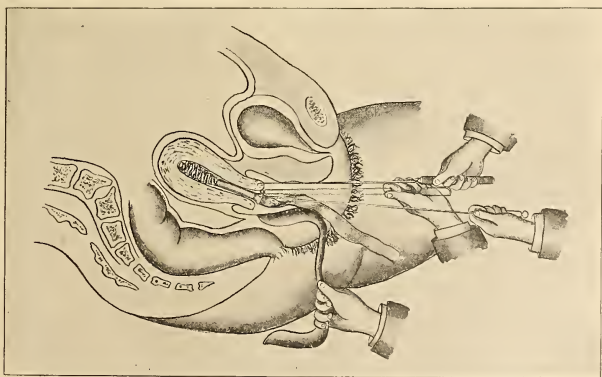
FIG. 92.



Instruments for Applying the Intra-uterine Tampon.

gotten in with the packing forceps. It is usually, however, difficult on account of friction to tampon the uterine cavity except through

FIG. 93.



Tamponing the Uterus with Iodoform Gauze by means of the Intra-uterine Packer.

an intra-uterine speculum, in which case it is first necessary to dilate the cervix. The uterus should be packed as tightly as possible, and

the end of the gauze left projecting from the cervical canal. The canal itself should be only loosely packed, else the gauze will not drain the cavity. A light dressing of gauze is then applied to the vagina. The patient should not be allowed to soil the dressings with urine if it can be avoided. After each urination or movement of the bowels the vulva and perineum must be cleansed by a free use of a saturated solution of boric acid or other cleansing solution.

When repair begins, the uterus being relieved of the septic process, the new leucocytes and plasma-cells are not forced to exercise their phagocytic property by battling with pathogenic germs, but the plasma-cells have a healthy pabulum, and devote their entire energy to the work of regeneration. It is not merely non-suppurating repair; it is histiological growth.

#### CURETTAGE IN ACUTE PELVIC INFLAMMATIONS.

The question of the propriety of curetting the uterus in the presence of acute tubal and peritoneal manifestations may be dealt with here. If the article on the anatomy of the endometrium be consulted, and one reflects that pelvic peritonitis is very rare in men, he will be forced to believe that the pyogenic germs reach the woman's pelvis through the uterus. That granted, it will become apparent at once that the sequence of pathological changes must either be endometritis, salpingitis, and peritonitis; or endometritis, metritis, pelvic lymphangitis, and peritonitis. The question then is proper: Does this causative endometritis cease the moment the pelvic complication arises? Surely it does not. The peritonitis is not a disease *per se*, but merely an effort on the part of nature to check a disease. One of its first acts is to shut off the tubal inflammation from the peritoneum, by closing with adhesions the fimbriated opening of the Fallopian tube, thus cutting off further extension through that channel or, in case the sepsis travels through the lymphatics between the folds of the broad ligaments, by effusion of lymph to isolate the infected area. So rapid is absorption in this direction, in some few cases, that the general peritoneum may appear normal, and yet evidences of the infection present themselves on the diaphragmatic peritoneum as the first point above the pelvic lesion. It is irrational, then, to consider these septic conditions in the light of their results only, ignoring the original source of the trouble, which still remains septic and continues to feed the fire. So long as the infectious focus remains, just so long will the peritoneum throw



out lymph. When once the septic focus is removed, the lymph-effusion will cease, and the possibility of further extension from the original source is out of the question. The patient, relieved from the ptomaine-poisoning, ceases to vomit, the emunctories work properly, and the digestive functions are well performed. From a state of acute poisoning, the case has, by this removal of the causative disease, been converted into one having only the results of the infection, though these are grave. It is eminently proper, therefore, in theory, to curette the uterus before dealing with the sequelæ, in all cases of acute septic endometritis with salpingitis or peritonitis. In practice this theory has been proven correct and the results positive. Too many successful operations in cases of both septic and gonorrheal origin have been reported to admit of question as to the propriety of the method. Since attention was first drawn to the subject it has been adopted by many surgeons as the first operation indicated in these cases of acute septic endometritis with tubal and peritonic inflammations before the complications are dealt with. If, as is at times the case, it be deemed necessary to deal first with the complications, the diseased endometrium should subsequently be treated if the uterine symptoms persist.

The other methods of treating these cases are by the "expectant" plan of opiates and poultices, or immediate celiotomy—a procedure extremely irrational in view of what we now know of the pathogeny of pelvic inflammations. In no other part of the body is the unsurgical rule applied of removing the result of acute septic infection and ignoring the cause. Still more is the abdominal section contraindicated, as under these conditions it is made at the worst possible instant. Tubal abscess must ultimately be removed and adhesions severed. But if the primary celiotomy be made, it is in a mass of effused lymph and distended and adherent guts, and oftentimes in the presence of acute infectious pus—pus which in several weeks or months will be comparatively innocuous.

When the curettage is properly performed the improvement in the local condition is at times marvellous. Irrespective of its effect upon the result and technique of a future celiotomy, curettage is positively indicated in every case of acute tubal and peritoneal disease, when there is even a suspicion that the infection originated in the endometrium; that is, in the majority of cases. Some of the acute symptoms, as fever, arise not from the pus-focus in the tube



or ovary, for such is more or less isolated from the general absorptive system, but from the septic endometrium pouring into the lymph-streams an endless supply of septic material. If there is a distinct pus-accumulation in the pelvis, this will have to be separately treated, for curettage has no influence upon such conditions. It is in cases of acute purulent salpingitis—cases presenting tubes deeply injected, swollen, friable, and occluded, but which upon section reveal little or no dilatation of their lumen—that curettage secures its greatest results. Furthermore, if by any possibility there is no tubal disease, the curettage will remove every trace of the infection. In these tender women positive and precise statements of the pelvic changes are often difficult, and masses of lymph-effusion are frequently interpreted as tubal abscess. The method is no longer new and experimental, but is the one accepted by many American gynecologists. Brought to a case of acute salpingitis and peritonitis, the indications are, not for a brilliant removal of the adnexa, but rather to adopt that method which will preserve the woman from those gross changes in the peritoneum or adnexa, for which so many celiotomies are done, and to save her, if possible from an abdominal section. So wonderful is the ability of the peritoneum to absorb and repair, that it should in all acute cases be given an opportunity. In the light of its causation, of its pathology, even of its results, acute tubal and peritoneal inflammations of uterine origin, are to be treated by curettage and gauze packing as the primary operative procedure. One of three methods must be adopted with these cases: either poultices and hot douches, curettage, and treatment of the uterus as any septic cavity, or a primary celiotomy. The first is the method of the midwife, and merely allows the infection to work its will in the pelvis. The second is surgical in every sense of the word; while to adopt the third in every case, stamps a man as blind to reason and to the work of other men, and as willing to open a fellow-being's abdomen rashly and unnecessarily.

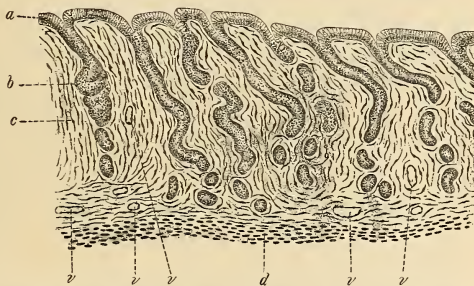
We know that septic endometritis has but a small percentage of mortality, but what frightful ravages it makes in the peritoneum and adnexa! We know that many men apply the curette improperly, and that possibly women are oftentimes worse after it than they would be were they let alone. But should faulty technique and ignorance deter us from laying down the proper treatment? Therefore the rules—and golden ones they are too—may be enun-

ciated: 1, treat all cases of endometritis in the light of its possible results; 2, treat all cases of septic and specific endometritis, with complications, in the light of their causes. If a sloughing polypus causes acute peritonitis, shall it not be first removed? If a sloughing endometrium causes the same complication, shall not the uterus be cleansed?

#### METHOD OF REPRODUCTION OF THE ENDOMETRIUM.

Repair and reproduction, after removal of the endometrium, is accomplished by means of the lymphoid cells and multiplication of the epithelium and plasma cells. If these are met by pathogenic germs

FIG. 94.



Vertical Section Three Months after Curettement: *a*, epithelium; *b*, new-formed glands; *c*, connective tissue; *d*, muscular tissue of the uterine walls; *v*, *v*, blood-vessels.

in numbers, their whole effort is concentrated upon the conquest of the germs. Consequently the leucocytes die in large numbers and form pus, while the plasma-cells, deprived of their normal pabulum (leucocytes), are limited in the function of tissue-formation, and result largely in the production of connective tissue.

Hence it is that after an aseptic curettage the endometrium is reproduced in a normal condition in about two months. Conversely, after the membrane has been removed by means which result in suppuration, the endometrium is reproduced but imperfectly.

Fig. 94 is taken from a uterus three months after curettage, and it will be noticed that in almost every particular it is a normal structure. It resembles the endometrium of a young girl soon after the menstrual function has become established.

This specimen (Fig. 95) was removed from a woman to whose uterus chloride of zinc had been applied fifty-three days previously.

FIG. 95.



Vertical Section of the Uterine Mucous Membrane Fifty-three Days after the Application of a Caustic: *a, a*, epithelium; *b*, connective tissue; *c, c, c, c*, section of the glands which have undergone cystic degeneration; *d, d*, tubular glands enormously dilated; *m*, muscular tissue of the uterine wall.

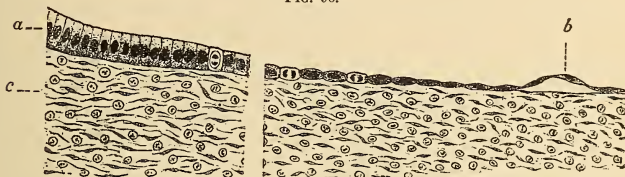
It will be noticed that the condition here is one of atrophic endometritis of a pronounced degree, with marked interstitial hypertrophy—exactly similar to chronic interstitial endometritis. The gland-follicles are caught in the new connective tissue and form cysts, while the surface of the membrane is covered by epithelium; the glands are scarcely to be found.

These plates prove very conclusively, the facts which have been amply substantiated by clinical experience. It is fair to assume that any caustic agent, which can penetrate as deeply as chloride of zinc, will have the same effects. Such agents are nitric acid, caustic soda, and very strong electrical currents. Similar but less marked changes are induced by the use of strong antiseptics, such

as carbolic acid and bichloride-of-mercury solution, and too free applications of tincture of iodine when these are used after curettage.

The manner in which reproduction of the mucosa ensues is well shown in the accompanying illustrations.

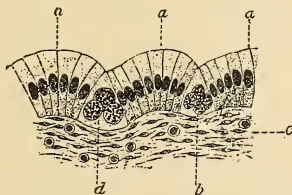
FIG. 96.



Perpendicular Section of the Uterine Mucous Membrane Thirteen Days after Curettage: *a, b*, epithelium, newly-formed; *c*, newly-formed connective tissue.

The exact method of reproduction of the endometrium is not definitely known. The first step is the extrusion of lymphoid and plasma cells upon the raw surface produced by the curettage. These rapidly form a layer covering the entire inside of the uterus with flat cells which ultimately become ciliated cylindrical epithelium. The subjacent tissue grows so rapidly and the epithelial cells mul-

FIG. 97.



Perpendicular Section of the Uterine Mucous Membrane Thirty-one Days after Curettage: *a, a, a*, cylindrical epithelium; *b, d*, proliferating cells in the deeper part of the epithelium; *c*, new-formed connective tissue.

tily so fast that the surface of the membrane is thrown into a wavy line, which, as the process continues, takes on the characteristics of a plane surface studded with innumerable crypts. Thus is the new, perfect endometrium evolved from the basement membrane, after curettage.

The AFTER-TREATMENT of cases of curettage for acute tubal or peritoneal disease is as important as the operation. In all cases of curetting after conception, irrigation should be practised on chang-

ing the dressing. The details of the treatment are governed entirely by the two great principles: cleanliness and drainage. It would be folly to remove the primary packing from a large uterine cavity and not keep the cervix open; this would merely result in a reinfection, as curettage and irrigation do not remove every particle of sepsis: the cocci are in the lymphatics and often in the venous sinuses. After curettage, the septic uterus must be treated as any other septic granulating cavity, with this distinction: packing should cease when the uterus is reduced in size and its secretions become free from pus-cells. Further treatment may be necessary if the organ remains enlarged. Curettage does not absolutely prevent those symptoms which follow subinvolution, as hemorrhages. Therefore, a curettage done for infection in a puerperal uterus may, later on, have to be repeated for the hypertrophic membrane which gives rise to the bleeding, and which forms upon the enlarged uterus. Hence the use of tampons wet in ichthyol (10 per cent.) and boroglyceride (90 per cent.), applied twice a week to the cul-de-sac, is to be recommended in all cases of enlargement of the uterus. It will be found that the ichthyol tampons will very much lessen the pain which accompanies salpingitic and peritonitic effusions. It is wise in cases of retroposition to tampon the vagina with gauze, so applying it that it will act somewhat as a pessary in supporting the fundus. As a final caution the most scrupulous attention to every detail of aseptic work must be employed at each dressing, lest the case be reinfected. This point cannot be too strongly insisted upon. Opium should not be used. The bowels should be kept open. After curettage the menses are apt to occur a few days earlier than the usual date. All treatment should be suspended during this period, except where the uterus is septic. Menstruation has no effect upon the routine methods other than to require more frequent changing of the dressings.

#### ELECTRICAL TREATMENT OF ENDOMETRITIS.

The advocates of electricity in the treatment of endometritis have not, as yet, established any substantial principles, applicable equally well to all parts of the body. They do not tell us the effect of electricity upon the various cocci, or its influence upon the living cell. Does it cause unstripped muscular fibre to contract or to become flaccid? What is its influence upon the white blood-corpuscles and plasma-cells? Take its application in



cases of simple endometritis. The application of even slight currents causes the epithelium to exfoliate. The negative pole with from 50 to 70 milliampères for ten minutes, the strength some authorities advise, does more than cause exfoliation of the epithelium—it destroys tissue for a slight distance. In septic endometritis it is said that the current destroys the cocci. Staphylococci will survive being dried upon a cover-glass for ten days, and are then destroyed by exposure of not less than ten minutes to boiling water. Will even 100 milliampères do that? But granted that the currents used *will* destroy cocci, what effects have they other than this? A very mild electrical current stops the ameboid movements and checks the processes of cell activity, while it lasts. Currents of moderate intensity destroy the vitality of all protoplasm within reach of the currents. The interpretation of this is very simple. It means that currents much too light to prove germicidal, cause exfoliation of the protecting epithelium, destroy the property of diapedesis of the white blood-corpuscles, and destroy the karyokinetic property of the cells or their ability to multiply. These currents rob the locality to which they are applied of nature's sole defenses against pathogenic germs—epithelium, white blood-corpuscles, multiplication of cells.

By curettage, dead tissue and useless cells are removed. Useful living tissue is not destroyed, but the plasma-cells of the various tissues are given an environment propitious to their development and growth. Can electricity remove the entire septic endometrium in a few minutes, and in a month produce a new healthy one capable of forming a placenta and nourishing a fetus? The surgical methods here laid down can. Conception has taken place five weeks after a curettage for purulent endometritis.

The great scientific truths upon which, deductively, the method by curettage with its positive results, has been produced, cannot be ignored for another, based upon empiricism, and unsuccessful empiricism at that. The established surgical rules which, the world over, are accepted for inflammations in other parts of the body, are applied to the treatment of endometritis; and until gynecologists who practise the electrical treatment, can lay down for our guidance the positive indications to be filled, and *reasons* for their propositions, indications which are scientific and facts which are not mere personal statements, the use of this measure cannot be recommended. Glittering generalizations will not suffice. What they propose to



accomplish within the hidden organs must have been successfully tried on those within view. If fibrous tissue may be removed within, so may it without. If suppuration may be checked within, ample opportunity presents for testing it without. If glandular hypertrophy is corrected in the uterus, so may it be elsewhere. A few years back, when gynecology consisted merely of the dictum of one or two world-famed men, the electrical treatment might have become established. To-day, in the critical light of modern research and the generous distribution of knowledge, it exists, not because of true merit, but through the timidity of suffering womankind, who grasp at the hand offering relief "without an operation."

#### INFLAMMATION OF THE CERVIX.

The cervical mucous membrane, because of its anatomical characteristics, is less often the seat of destructive inflammatory changes than the endometrium. Classification of changes in the cervix is usually made according to the clinical appearances. This is too confusing and elaborate. Every case of cervical disease which is neither malignant nor tubercular may be placed in one of the following classes:

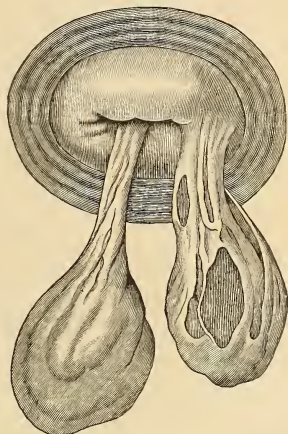
- Septic and Gonorrheal Endocervicitis.
- Glandular Endocervicitis.
- Cervical Hypertrophy.
- Cicatricial Stenosis.

*Septic and Gonorrheal Endocervicitis.*—Acute gonorrheal and septic processes here are not important, except in view of the possibility of extension to the endometrium. The cervical mucous membrane is dense, with few lymphatics, and drainage is so readily obtained, that pelvic lesions from cervicitis are rare if they ever occur. Acute specific infection of the cervix seldom remains local, but soon becomes general in the uterus. It is as a chronic inflammation that we most often see cervical lesions existing alone. Its compound racemose glands do not readily shed their epithelium, and cocci rest for great lengths of time, attenuated and quiet, in their secretion, even without producing purulent discharges. This fact being known, we are able to explain the development of latent gonorrheal endometritis and accept the possibility of auto-infection. We can also account for those apparently inexplicable cases of uterine and pelvic inflammation which sometimes follow the pas-

sage of an instrument through a cervical canal not previously cleansed.

*Glandular Endocervicitis.*—This takes the form of enlargement of certain portions of the normal folds. There is a projection or budding of the membrane, and as this increases the mouths of the glands become obliterated. The imprisoned glands continue to secrete, and the enlargement thus becomes pedunculated, forming

FIG. 98.



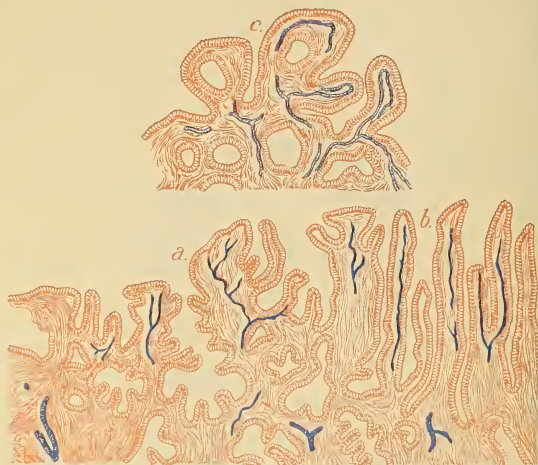
Mucous Polypi from the Interior of the Cervix and upon the Surface.

a true polypus. Again, the epithelium of the cervix may be exfoliated as the result of a vicious discharge from above; or injuries from below, such as lacerations, may cause the production of granulations and erosions. But, contrary to the general opinion, instead of there being a loss of tissue with this condition, the eroded surface projects beyond the line of healthy membrane. As a result of long-continued irritation to its glands the connective tissue of the cervix may become moderately increased, thereby occluding the glandular canals, and in this way the entire cervix may become riddled with cysts, constituting *cystic degeneration*. Some of these cysts contain clear fluid and some pus.

**SYMPTOMS.**—As all forms of cervicitis entail an enlargement of the cervix, there is the constant symptom of weight and heaviness in the pelvis. Acute septic and gonorrheal cervicitis is usually asso-

ciated with some other symptoms of these infections, but, if occurring alone, the special symptoms are, that the cervix is engorged,

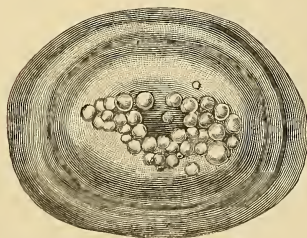
FIG. 99.



*a, b, Simple Papillary Erosion ; c, Follicular, slightly enlarged.*

often eroded, and secreting its peculiar mucus, tinged with blood perhaps, but always very purulent. The cervical canal is often

FIG. 100.



*Simple Follicular Cysts of the Cervix.*

gaping. Removal of this mucus is not followed by pus from above, showing the endometrium to be uninvaded. The several cocci are found by the microscope. The symptoms of chill and fever are

wanting. Upon the subsidence of the more acute phenomena there will remain but the purulent discharge and some erosion. As has been said, acute septic and gonorrheal cervicitis tend to travel upward, and rarely will a case be seen before it has done so, owing to the absence of general symptoms due to the cervicitis alone. Glandular cervicitis, especially when it has gone on to the formation of polypi, produces a purulent (often profuse) discharge, in addition to the subjective symptoms of bearing-down and weight. The most prominent reflex phenomena accompany cystic degeneration and interstitial cervicitis. Headache is constant and the patient is very nervous. She is very emotional and prone to hysteria, the nervous symptoms being fairly well proportionate to the amount of interstitial change and follicular degeneration. The cysts project from the vaginal aspect of the cervix as rounded nodules, like blisters. If one be pricked, nothing escapes, but gentle pressure forces out a pearl of tenacious mucus. They occur not only on the surface, but in the deeper parts of the cervix also. In glandular cervicitis the canal is usually open, and by separating the lips the enlarged glands may be seen.

**TREATMENT.**—Acute gonorrheal and septic endocervicitis are to be most vigorously treated. The plug of mucus must be removed, and the application of powerful antiseptics made, as pure carbolic acid, care being taken not to invade the inside of the uterus. The condition is very hard to check, and is extremely liable to become chronic; but even then there is no better application than carbolic acid. Erosions due to purely local causes, as pessaries, can readily be cured by removing the cause and keeping the parts clean. Erosions are almost always dependent upon some form of glandular inflammation, either in the cervix or above, and are to be relieved by curing that cause. The association between cystic degeneration and beginning epithelioma is very close, while polypoid cervicitis is simple adenoma. Therefore the operative procedures directed to the cure of the latter need not be so radical as for the former. Inasmuch as polypoid cervicitis is seldom general, excision of the polypi is all that is necessary for isolated growths. This can be done under cocaine application. Should, however, it be associated with much interstitial hypertrophy, or the polypoid growths be general over the cervix, the excision of a portion from each lip will be of benefit in producing contraction.

A general cystic degeneration is amenable to the wedge-shaped

amputation of the cervix, an illustration and description of which will be found in the chapter on Malignancy. It is a good operation, giving most excellent results, and many cases now subjected to Emmet's operation of trachelorrhaphy would be better operated upon by this method.

*Cervical Hypertrophy.*—Cervical hypertrophy may be so great as to simulate prolapsus, and, indeed, it may produce a certain amount of descent, but the fundus is always found higher than in prolapsus. The total length of the uterine canal is greater, the increase being chiefly in the cervix; there is no rectocele, but a spurious cystocele accompanies the condition, as the urethra and base of the bladder follow the increased growth of the cervix. Still, the caution is necessary, that in amputating these hypertrophied cervixes great care be exercised lest the bladder be opened, as the hypertrophy may spring from near the os internum, in which case the vesical organ will be dragged down with it. The sound in the bladder, however, will show the relations of that organ to the hypertrophy. The cervix may be so generally inflamed and, at the same time dilated, that the membrane will be rolled out, forming a true ectropion, and presenting the evidences of glandular hypertrophy, even amounting to glandular polypi. Excision is here necessary by the method already indicated.

*Cicatricial Stenosis.*—As a result of operations, inflammations, and application of caustics—rarely as a congenital lesion—we may have a cervical canal so contracted as to form a true stenosis or an atresia; the condition may even give rise to hematometra, and require treatment as for congenital atresia. It is amenable to the operation of bilateral incision (splitting the cervix bilaterally by means of knife or scissors to the internal os), followed by forcible dilatation. The after-treatment is long and tedious, and the patients are forced to remain under observation for a great length of time. This is necessary because the operation is usually done in a field of cicatricial tissue, which tissue possesses an inherent tendency to contract, repeated or continuous dilatation being necessary for its prevention. Stem pessaries are here worn with advantage for a space of some months.

In the milder cases the bilateral incision is to be followed by gauze packing for three weeks, the packing being limited to the cervix alone.

These incisions, followed by dilatation, are covered over by a



modified form of mucous membrane in a remarkably short time. Stem pessaries are not necessary, unless the tissue be newly-formed cicatricial tissue; in other cases the cervix will remain dilated around even a very fine filament of gauze, and while the latter is in place the formation of the new membrane goes on speedily.

In considering all these questions involved in the treatment of diseases of the uterus it must not be forgotten that the organ is embryonic and capable of reproducing its tissues to a certain extent, but reproduction does not take place from scar-tissue or in the presence of suppuration. The faculty of reproduction from the basement membrane, when once the mucosa is entirely removed, is not inherent in the cervical mucous membrane. This, once removed, is never re-formed.

#### METRITIS.

This condition is of very minor importance, because it is merely a name for certain changes in the muscular walls, secondary to more important conditions. An idiopathic metritis does not exist: it is always secondary to, and an extension of the inflammation of the endometrium. Inflammation of the muscularis uteri follows all acute and many chronic infections of the mucosa. The treatment of the two conditions is identical, and has already been fully considered under Endometritis. A low form of tissue change also accompanies the various neoplasms, flexions, and versions. These will be described in the proper places.

#### SUBINVOLUTION.

The condition known as subinvolution which follows labor is not, *per se*, a disease, but merely an association of conditions resulting from a common cause. The uterus has not yet fully undergone those retrograde changes which normally follow labor. It is enlarged in all its diameters and the mucosa is thickened. The organ being heavy and its walls softened, it shows a tendency to sink low in the pelvis or take a retroposition.

The intimate histological condition is one merely of fatty, enlarged, unstriped muscular fibres, enlarged vessels and lymph-spaces, and glandular hypertrophy of the mucosa. It can scarcely be termed strictly a pathological condition, rather is it an incomplete physiological one. When it has persisted for some time, fibrous





Locally, intra-uterine applications of tincture of iodine, with the supporting and depleting tampon of ichthyol 5 or 10 per cent. in 50 per cent. boroglyceride, twice a week, are all the requisites for effecting a cure, in the absence of any acute symptoms. Hot vaginal douching should be employed twice each day between treatments. If the hemorrhages are of serious moment, curettage not only removes that factor, but materially hastens the involution. General treatment is of great importance.

If subinvolution be neglected, the organ is prone to take on almost any form of inflammatory change, and is especially liable to septic infection. The condition materially reduces the organ's resistant power against pathogenic germs. Many cases of grave pelvic lesions and uterine displacements may be traced to neglect in guarding against this condition after confinement or abortion. Subinvolution is very frequently caused by a septic or specific infection of the uterine cavity in the puerperal woman, resulting in an endometritis. Such cases resolve themselves eventually into a true condition of metritis and endometritis, and are to be dealt with as such.

#### HYPERINVOLUTION.

The condition known as hyper- or super-involution follows labor, and is due to causes unknown. The natural involution of the uterus following labor reduces the size of the organ slightly below its normal condition, but subsequently, within the course of a few weeks, this loss is regained. Occasionally involution does not cease at this point, but continues beyond the physiological condition, until the womb becomes, at times, even as small as an inch or an inch and a half in depth. The causes which change the physiological process into a pathological one are obscure, and can rarely be detected. Fortunately, the occurrence is rare, as the condition is extremely difficult to treat successfully, most commonly baffling all the efforts of the physician.

Painful and scanty menstruation are common attendants, and are, in fact, the principal symptoms. The dysmenorrhea is of a severe and persistent type, usually appearing prior to the flow and lasting throughout its whole course, and is undoubtedly due to the atrophic condition of the endometrium. The ovaries may or may not be involved in the process: should they become involved, it would be

one more causative factor added to the dysmenorrhea, and would exaggerate that condition.

The physical examination, together with the history, renders the diagnosis clear. The uterus is found small and its walls of firm consistency, at times almost fibroid in character. The depth of the uterine cavity is reduced from two and a half inches, the normal, to one or one and a half inches.

The medical treatment of the disease is not productive of any assured success. It consists in rendering the patient's general health as nearly normal as possible, at the same time stimulating the uterine muscle. Probably electricity, both general and intra-uterine, gives as much promise of success as anything. Should the physician's efforts be attended with good results in accomplishing a return of the uterus to its normal size, the menstrual flow will become more natural in quantity and the dysmenorrhea will gradually disappear. Most often the treatment consists in simply controlling the pain. Efforts in this direction will be accomplished by much the same means as given in the chapter on Dysmenorrhea. As a rule, the patients will have to be content to bear their sufferings as best they may, with what amelioration drugs will give, until the change of life ends their period of probation. Should the pain become so great as to render life miserable, a resort may be had to ovariectomy with the view of bringing on an immediate menopause. The justification of this procedure must rest entirely with the individual case, the event being determined by the amount of suffering and the failure either to cure the condition or to relieve the symptoms. It is far better to perform the operation of removal of the ovaries than to have continuous resort to opium, with all its attending dangers. The question of childbearing need hardly be considered, if for no other reason than that these women are rendered sterile by their condition. Pregnancy, if it could be brought about, would probably produce a cure, or rather it might be nearer the truth to say that this condition would be proof that a cure had been accomplished, as pregnancy is most improbable until there is a return to the normal condition of the endometrium.

## LACERATIONS OF THE SOFT PARTS.

### LACERATION OF THE CERVIX UTERI.

LACERATION of the cervix is one of the commonest of all gynecological affections, and is the consequence of dilatation of the cervix, whether by the head of the child in labor or by the uterine dilator in the hands of the gynecologist.

The tear occurs in consequence of the refusal of the external os uteri to dilate sufficiently to allow the head of the child to pass, and the result is a rupture which extends a variable distance up into the uterus and into the vault of the vagina along the base of the broad ligaments.

These ruptures are with remarkable uniformity bilateral; occasionally unilateral or stellate.

Deep fissures, unaccompanied by lateral tears, occupying the median line in front or behind, are almost without exception susceptible of some other explanation. Posteriorly, for example, many cases are observed in which the operation of discision, or splitting of the cervix for the relief of dysmenorrhea, had been practised. Anteriorly, a median split is often significant of the surgeon's knife or scissors, used to incise the rigid os, or more often it arises from the use of the obstetric forceps.

The immediate danger arising from these tears is the ready access afforded for the invasion by septic germs of the pelvic connective tissue. This is to be prevented by unusual care during the confinement and puerperium, in avoiding sepsis by cleansing the vagina before labor where there is any purulent discharge, and by maintaining an aseptic condition during the confinement.

If it is necessary to handle the cervix, this should be done with a sterilized rubber stall drawn over the finger. After the

confinement, douches should not be given as a prophylactic, but become necessary when the existence of an infection has declared itself.

It is not proper, in view of our methods of to-day, to attempt the immediate repair of cervical tears. When, however, there is a constant flow of arterial blood, trickling in a small stream from between the labia, and digital examination reveals the presence of cervical laceration, it will be found at times that the hemorrhage proceeds from the rupture of a cervical artery. In such a case an immediate operation must be undertaken. The patient should be brought to the edge of the bed in the dorsal position with the thighs flexed upon the abdomen and the posterior vaginal wall retracted with a Sims speculum. The blue, soft lips of the cervix appear low down in the vagina; they should be grasped by a pair of bullet-forceps, drawn down to one side, and the tear from which the bleeding comes exposed. The operator then passes a suture deeply through the tissue, in such a way as to include the vessel and serve at the same time to approximate the torn lips. Two or three similar sutures below this uppermost one will serve to secure an accurate approximation of the lips throughout. The sutures must not be tied tightly, and no dressing should be applied in the vagina. Such an operation will be almost invariably successful. The sutures may be left in place for six or eight weeks if necessary.

Where an operation is unnecessary for the purpose of controlling hemorrhage, the patient is to be treated on the expectant plan and if no sepsis occur, a spontaneous closure of the laceration will take place.

Some months or some years after a confinement one of three appearances will be observed in cases of laceration of the cervix: First, the cervix presents a normal appearance with a slight or

FIG. 102.



FIG. 103.

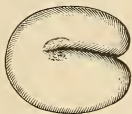


Side and Front Views of a Simple Bilateral Laceration, requiring no treatment.

a marked notch on either side; secondly, the cervix presents two well-defined lips, and is even torn down to the vaginal vault: the lips are soft, flaccid, and not thickened; thirdly, the tear is not so

evident on inspection as in the last variety, but the cervix appears thickened, and hardened, its angry red centre presents the appear-

FIG. 104.



Front View of a Unilateral Laceration requiring no treatment.

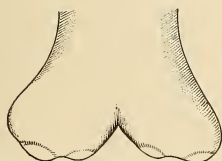
FIG. 105.



Side View of a Unilateral Laceration; such a laceration may cause abortion in the latter months of pregnancy.

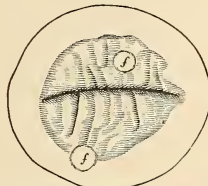
ance of an erosion, and distended glands are more or less abundant. Out of the cervical canal exudes a glairy or muco-

FIG. 106.



Side view of a Bilateral Laceration, requiring treatment. The lips are everted, and the Nabothian follicles stand out as prominent papillæ.

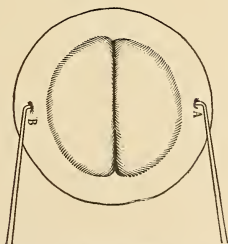
FIG. 107.



Front View of a Bilateral Laceration, showing eroded area and Nabothian follicles.

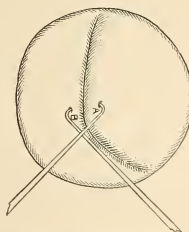
purulent secretion, which continually irritates the ulcerated part and prevents it from healing; in fact it has in the beginning been

FIG. 108.



Tenacula in place, showing eversion of lacerated cervix.

FIG. 109.



Tenacula crossed, showing the method of approximating the lacerated lips, demonstrating the true condition.

the origin of the ulceration. On catching the anterior and posterior margins of the cervical lips in two tenacula and attempting to draw



them together, it is at once evident that there is a laceration with well-defined lips, which are deeply infiltrated. As the lips are drawn together the erosion in the centre is turned in and disappears, showing that it is a part of the mucous membrane of the cervical canal. In other words, the condition is that of a lacerated cervix with everted and eroded lips, that condition so frequently mistaken in the past for ulceration of the cervix. This third class of cases is the only one demanding treatment.

It is an undoubted fact that the majority of cases of cancer of the cervix occur in women who have borne children and have a lacerated cervix. It is also undoubtedly true that cancer of the cervix uteri occasionally occurs in nulliparous women. The only reason for the surgical treatment of the first two classes would be the fear that any ulceration of even small degree would have a determining influence on the development of cancer. This fear is, however, not so well supported by facts as is generally supposed.

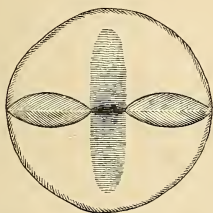
Laceration of the cervix is frequently associated with subinvolution of the uterus and pelvic venous stasis. Leucorrhea, dysmenorrhea, aches and pains, a feeling of weight and bearing down or dragging referable to the pelvis, associated with a feeling of general weariness are the symptoms generally found in this condition.

The best method of relieving these associated troubles is by repairing the cervix, in order to start involution of the uterus, which process commonly follows operative procedures on that organ. The steps of the treatment consist in the proper denudation of the lips and approximation of the denuded surfaces by sutures. Where infiltration is very marked the lips cannot accurately be brought together, and therefore preparatory treatment is required.

*Preparatory Treatment.*—This consists in measures intended to deplete and diminish the size of the cervix. Douches of water, as hot as can comfortably be borne (110° F.), once or twice daily, for from ten to twenty minutes, followed by a rest for an hour, are valuable adjuvants. The cervix must be exposed by a bivalve speculum with the patient in the dorsal position. Depletion is then obtained with a fine knife, opening as many distended follicles as can be seen. From four to eight drachms of blood should be drawn once or twice a week. By following each depletion with a 50 per cent. boroglyceride tampon, left in for twenty-four hours, the cervix in from three to six weeks will be reduced in size and quite flaccid, and in a favorable condition for the plastic operation.

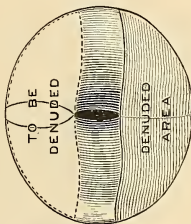
**OPERATION.**—As a preliminary step it is absolutely necessary to make sure by a bimanual examination that there is no inflammatory disease of the pelvis involving the ovaries and Fallopian tubes. The patient is then placed in the dorsal position, with the buttocks on the perineal pad and the thighs held well flexed on the abdomen by the leg-holder. The cervix is exposed by retracting the posterior vaginal wall with a Sims speculum, and the anterior and posterior lips are caught by bullet forceps and drawn down toward the vaginal orifice. A constant irrigation of the field of operation is kept up throughout the whole procedure. Drawing the cervix a

FIG. 110.



Incision in the Angles of the Laceration.

FIG. 111.



Method of Denudation.

little to one side, an incision is made in the angles of the tear as deep as the denudation on the lips is to be carried. Scar-tissue is often encountered in the angles, and the incision must extend below this, into healthy tissue.

From this incision the denudation is carried down, first on the posterior, then on the anterior lips, as shown in the diagram, by means of a sharp knife. Care must be exercised not to denude too much on the vaginal surface, and, on the other hand, to leave a small strip of undenuded mucosa in the centre of both lips, which strips represent the future cervical canal. Both lips are similarly denuded.

An effort is made in the denudation to go through the cicatricial into the sound tissue everywhere, and to make such denudations as will when approximated secure a conical cervix with a small external os to project into the vault of the vagina.

No fear need be entertained of wounding the circular artery. Any vessel which is divided during the operation will be controlled as soon as the sutures are introduced.

The sutures are of silkworm-gut and fine silk or catgut; the

former used at the points of greatest tension, and the latter when necessary to secure accurate superficial union between the tense deep sutures.

A small stout curved needle with its carrier is grasped in the needle-holder and a strand of silkworm-gut hooked into the loop. The operator, while the lips are drawn well apart by his assistants, introduces the needle just above the angle of the incision, on the vaginal mucosa, and with a sweep brings it out in the cervical canal high up. It then crosses the canal to a corresponding point, re-en-

FIG. 112.

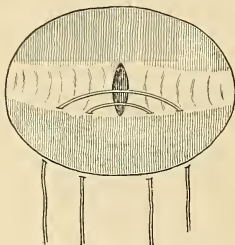


FIG. 113.



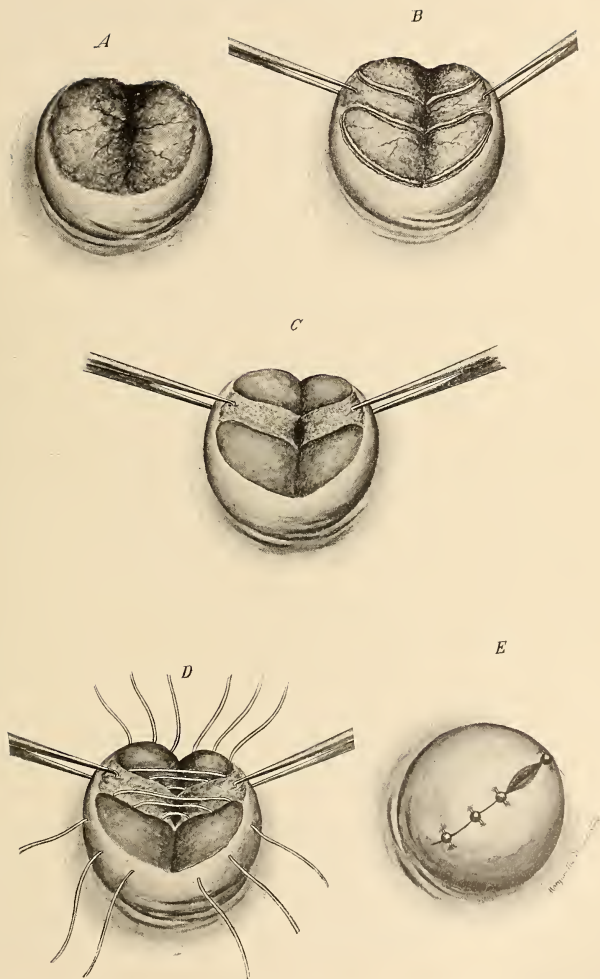
Silkworm-gut Sutures in place on one side, ready to be tied : front and lateral views.

ters the tissue, and reappears on the vaginal mucosa of the opposite lip, at a point opposite and corresponding to the point of entrance. A second suture is passed, in like manner, a little lower down on the lips, and often a third near the point. These sutures are left loose and clamped in a pair of artery forceps, while the sutures of the opposite side are introduced in like manner.

There are two ways of securing sutures so as to hold the lips snugly together : they may simply be tied in a square knot, or they may be held in place by running a perforated lead shot down, and pushing it up on the suture until the lips are drawn closely together, when the shot is squeezed and allowed to remain in place. When the vaginal outlet is operated upon at the same sitting, it will be easier to remove the cervical stitches if the shot are used. It is not necessary to observe such great care in removing all blood-clots from the angle of the wound before approximating, as has been generally supposed.

The uppermost sutures are tied first, and then in succession the other ones. Any pointing between the sutures should be disposed

PLATE XVII.

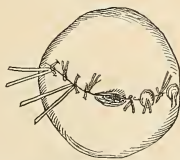


Steps of the Operation of Trachelorrhaphy for Bilateral Laceration of the Cervix Uteri: *A*, bilateral laceration with erosion; *B*, the area to be denuded has been marked out with the knife; *C*, the denudation has been accomplished; *D*, sutures introduced; *E*, completed operation.



of by introducing superficial sutures of fine silk or catgut between the silkworm-gut.

FIG. 114.



Silkworm-gut Sutures in Place, tied on the right and shotted on the left side; intervening Approximation Sutures of fine silk.

The vagina is washed out after the operation, and a loose iodoform gauze pack applied, which is left in place five or six days. The vulva is protected with sterilized cotton and a T-bandage.

It is not necessary for the success of the operation, so far as securing a good union is concerned, that the patient should remain in bed; it is, however, important in a certain class of run-down patients, for the sake of their general good condition and to make an impression on their nervous system, that they be kept in a recumbent position for two or three weeks. This combination of the rest cure with the operation is so important that it may well be doubted in many cases if the rest has not been the most important, if not the sole factor in the recovery.

Catheterization need only be practised when the patient is unable to void her urine. The bowels should be opened at least every other day by mild purgative medicines or by enemata of soap and water or oil and water.

The stitches should be removed in from three to six weeks; when the vaginal outlet has been operated upon, they should be allowed to remain two or three months undisturbed, to avoid dilating the outlet in their removal. They are best removed by placing the patient in the side position and retracting the posterior vaginal wall until one of the sutures is seen; this is caught by a pair of forceps and drawn down until its loop is exposed, when it is cut and the suture drawn out. It is important after all have been removed to make a digital examination in order to verify the fact. Sexual relations should be forbidden for three months.



## INCOMPLETE RUPTURE OF THE RECTO-VAGINAL SEPTUM.

*Recent.*—Recent incomplete ruptures of the recto-vaginal septum appear as furrows in one or both vaginal sulci, extending down to

FIG. 115.



Virginal Vaginal outlet.

the posterior commissure and involving the skin perineum as far back as, but not including, the sphincter ani. These furrows are made by the child's head or shoulders in passing through an outlet either relatively too small or through one whose tissues are not sufficiently elastic, or, again, in entering the outlet in a faulty position. The forceps are a frequent factor in the production of these injuries. Shallow tears of this character may be neglected, and if the parts are not infected during the puerperium their natural apposition will generally be sufficient to ensure a partial primary union, provided injections have not been given during the convalescence, and union prevented by the nozzle of the syringe entering into and separating the lips of the wound. Hemorrhages following

these lacerations are not often serious, but are at times exceedingly annoying.

Tears extending half an inch down into the tissue should be repaired at once; that is, within the first twenty-four hours. It is a common but serious error to estimate the amount of injury by a superficial examination of the external parts. This is insufficient, as the worst part of the tear usually lies concealed within the vagina, and can only be disclosed under a good light and by separating the labia and walls of the lax vagina by two fingers.

The process of suturing is simple. As the natural tendency of the tissues is to lie in apposition, but few sutures are necessary to assist nature in the repair, and the eye will at once detect the tissues to be held together by sutures. It is well during their introduction to control the uterine discharges by a tampon of iodoform gauze placed loosely against the cervix. Two or three silkworm-gut sutures are sufficient to close a long vaginal rent. The first one should be introduced at the upper angle of the tear on the side toward the median line of the vaginal floor, and passed well down to the bottom of the sulcus, where it is brought out. It is reintroduced at a point near its exit, and is carried up and brought out at a point on the mucous membrane of the pelvic side of the laceration directly opposite the point of original entrance. On the skin surface two or three superficial or half-deep silk sutures will complete the approximation. A dry powder of boric acid or boric acid and iodoform (7 : 1), and a loose vulval pad of absorbent cotton, complete the dressing, which should be renewed frequently for the first few days. In eight or ten days all sutures may be removed, and, in the absence of sepsis, the union will be perfect if the sutures have been well applied.

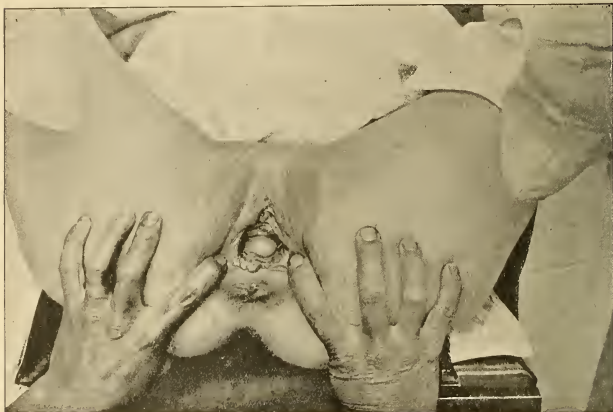
#### OLD INCOMPLETE TEAR.

*Relaxation of the Vaginal Outlet.*—If a recent incomplete tear is neglected, there may be one of several results: a complete union, which is unfortunately rare, may occur throughout without interference. A partial union may take place at the bottom of the tear while the upper part granulates and cicatrizes: the cicatricial contraction in such a union may be sufficient to compensate for the deficiency created by the tear. Finally, the result of such an injury is a permanent deficiency at the introitus, resulting in a relaxed outlet, from which the vaginal walls become more and more

everted, forming cystocele and rectocele in the erect position, and from straining efforts, until finally in some cases the bladder, cervix, and uterus escape, a prolapse following as the result of the relaxation.

A relaxed vaginal outlet is recognized by the flatness of the crease between the buttocks in front of the anus. Often, a series of con-

FIG. 116.



Relaxed Vaginal outlet as seen in the dorsal position.

centric wrinkles surround the entrance of the vagina, which is dropped back nearer the anus. The commissure of the labia may be entirely uninjured, or it may be torn down to the sphincter, and replaced by a pit of scar-tissue. This latter fact in no way influences the condition.

On separating the labia on either side with the fingers, the outlet presents an everted, gaping appearance, and on testing it with the fingers, its structures are found lax and incapable of resistance. The cervix is readily exposed by making a speculum of the fingers to push back the anterior and posterior vaginal walls, and the uterus is quite often found retroposed and in descensus.

The direction of the outlet in cases of relaxation is characteristic. Normally, it points downward and backward toward the end of the sacrum, while here its direction is toward the promontory or into the abdomen.

The symptoms occasioned are numerous and in direct relation to the lesion. There is a feeling of pressure, of dropping out, of something protruding, and of discomfort on walking, the patient preferring the sofa; there is backache, and a dragging sensation, due to the increasing displacement of the uterus. Leucorrhœa and all

FIG. 117.

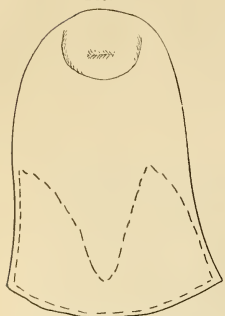


Appearance of Relaxed Vaginal Outlet in Sims's Position.

the symptoms of endometritis are apt to supervene. The bowels are constipated, as the expulsive efforts are wasted on the outlet, the sphincter ani muscle forming the greatest point of resistance. Nervous symptoms, referred to the stomach and head, are but expressions of the general loss of tone.

The treatment of this condition is by a resection of the outlet and both sulci in a similar manner to the Emmet operation. The denudation includes the posterior two-thirds of the outlet and extends up each sulcus in the form of a triangle. It is unnecessary to extend this denudation on the outside, beyond the ring of the hymen or its broken remains, but it should be carried not less than an inch or an inch and a quarter up each sulcus, and frequently even more. It is best to outline the area to be denuded with the point of a knife. Two points in the hymeneal ring on opposite sides are caught with curved tenacula between a half and three-quarters of an inch from the urethra. These points are represented by the lower caruncles or remnants of the hymen, and when drawn together will show the size of

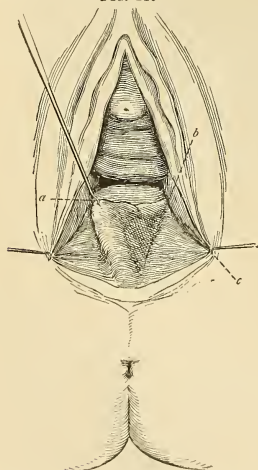
FIG. 118.



Looking down on the Floor of the Pelvis. Dotted lines indicate the area to be denuded.

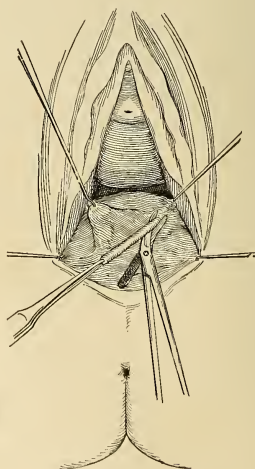
the repaired outlet, due allowance being made for future relaxation. The rectocele is now caught up by a tenaculum at a point nearest the vulva which is most easily lifted up to or near the urethra. By dragging slightly on these three tenacula the vaginal tissues will be so thrown into ridges as to disclose a deep sulcus running up the vagina on each side of the rectocele toward the cervix uteri (Fig. 119). These sulci represent the original tears, and were produced by the levator ani muscles and fascias retracting to the pelvic walls after being torn from their vaginal attachments. At the extreme end (toward the cervix uteri) of both these sulci a tenaculum is to be introduced into the tissue in the depths

FIG. 119.



The rectocele is seized with the tenaculum at *a*, and is drawn to the right, exposing the left vaginal sulcus, *a*, *b*, *c*, which must be denuded. The point *b* should be secured with a tenaculum before denuding.

FIG. 120.



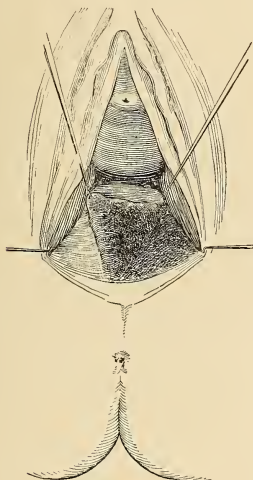
Method of denuding the sulcus.

of the sulcus: these points may be a half inch, they may be two inches, from the vaginal outlet. Five tenacula are now in place—



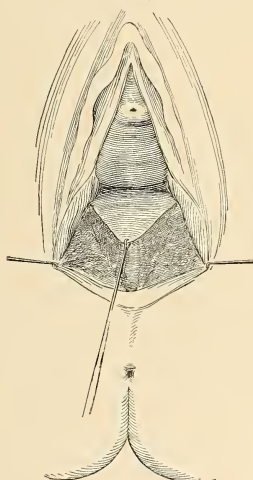
one on each side of the vaginal outlet at the lowest points represented by the remnants of the hymen, one at the uterine end and in the depths of each sulcus, and one in the crest of the rectocele. These five points may now be joined together by straight incisions made with the point of a knife, drawn first from the tenaculum in the crest of the rectocele to each of the tenaculi in the depths of the sulci, then from these two tenaculi (in the depths of the sulci) respectively to the tenaculi which catch up the caruncles (remnants of the hymen). Finally, the two tenaculi catching

FIG. 121.



The left sulcus denuded.

FIG. 122.



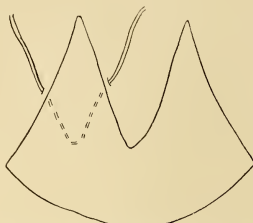
Both sulci denuded.

up the caruncles are joined together by a U-shaped incision running from one tenaculum down, around the posterior commissure of the labia, to the tenaculum on the opposite side, care being taken to keep the incision well within the mucous membrane and not too encroach upon the skin. The incisions would appear diagrammatically as shown by Fig. 123. All the mucous membrane included between these preliminary tracings is to be denuded. The denudation is rapidly made by catching up the tissues with dissecting forceps within the limits of the marking, and cutting it off in long strips with scissors curved on the flat (Fig. 120). Bleeding vessels



rarely require tying, as the sutures introduced immediately after the denudation control all hemorrhage (Figs. 121 and 122).

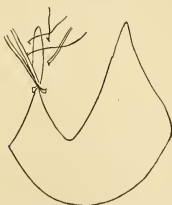
FIG. 123.



V-shaped Suture introduced and ready to be tied.

Sutures are introduced to bring the sulci together, and the first suture of silkworm-gut is placed about a third way down the right sulcus from its upper (uterine) end, entering and emerging on the vaginal mucosa close to the incision. The suture is introduced in the mucous membrane on the rectocele, carried down through the tissues to the depth of the sulcus and toward the vulva, where it emerges at a point half an inch nearer the vulva than its entrance; it is reintroduced as near its point of exit as possible, and carried through the tissues backward and upward to emerge through the mucous membrane on the pelvic side of the sulcus at a point directly opposite its original point of entrance on the rectocele. This constitutes Emmet's V-shaped suture (Fig. 123). At the bottom of the sulcus

FIG. 124.



V-shaped Suture tied, and Superficial Catgut Sutures in place.

FIG. 125.



Sutures tied on Right and in place, ready to be tied, on Left Side.

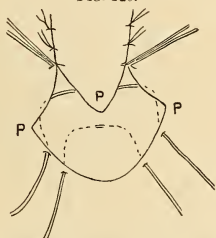
the suture appears at a point lower down toward the vulva than either the point of entrance or emergence. The suture, which is tied at once, drags back toward the cervix uteri the lower vulvar

part of the denudation and holds it there; it also serves as a tractor in bringing down the denuded area above, thus facilitating the introduction of the remaining sutures.

The silkworm-gut suture is tied, and the approximation above toward the cervix uteri is made perfect by three or four fine catgut sutures, each of which must sweep well under the tissue, the last one being introduced at the angle (extreme or uterine end of the sulcus) to prevent hemorrhage from the vessels cut during the denudation. In the opposite sulcus silkworm-gut and catgut sutures are placed in a similar manner (see illustrations).

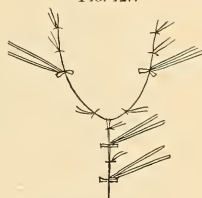
The wound area is now reduced to a shallow pit, representing the lower or vulvar end of the denudation in the sulci, on each side of

FIG. 126.



Sutures of both Sides tied, and the Crown Suture, together with one Superficial External Suture, in place.

FIG. 127.

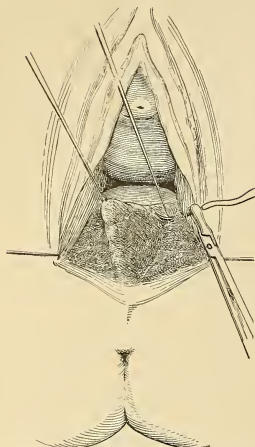


Completed Operation.

the central undenuded tit (crest of rectocele), and the more external parts of the denudation (Fig. 126).

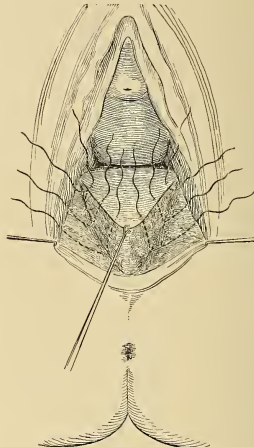
One or two additional V-shaped sutures placed in each sulcus progressively toward the vulva now almost completely close this whole area (Fig. 129). To complete the operation a silkworm-gut suture is introduced, gathering together the three original points represented by the tenaculum at the crest of the rectocele and the two tenaculi at the caruncles (Fig. 132). The suture is introduced into the mucous membrane inside the labia minora of one side, close to the denudation, and is carried under the lower caruncle, emerging in the denuded area close to the mucous membrane edge; it is then carried under the tenaculum in the crest of the rectocele, at a point far enough forward to avoid pulling on the rectocele when tied, and is then carried in a similar manner under the caruncle on the opposite side, emerging at a point corresponding to its original point of entrance. The points to be approximated by this suture (the so-called crown

FIG. 128.



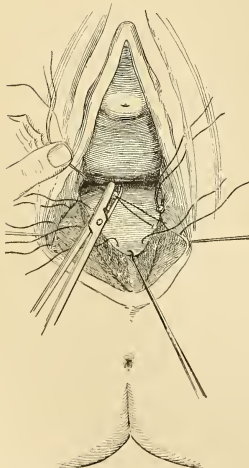
Introduction of the sutures. The point of the emerging needle is held by the tenaculum.

FIG. 129.



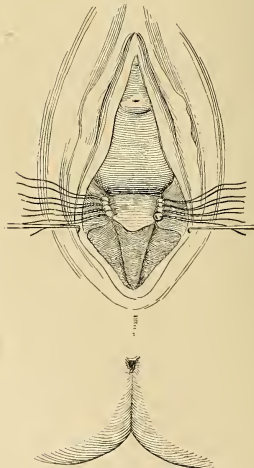
Sutures introduced in both sulci.

FIG. 130.



Method of securing sutures with perforated shot.

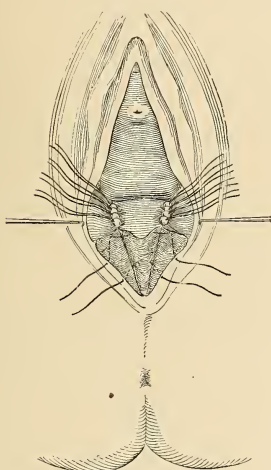
FIG. 131.



Both sulci are closed. The support of the perineum is restored. The posterior wall of the vagina is brought forward. The rectocele is cured.

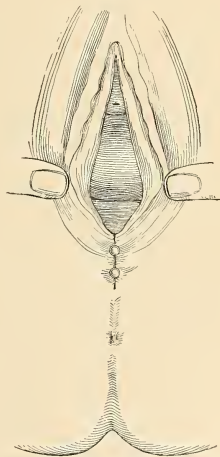
stitch) are represented in Fig. 126, by P, P, P. By drawing these points together with the suture the wound is contracted to a superficial area which can be readily approximated by a few superficial external silk sutures. On tying the crown stitch all previously placed sutures disappear from view into the vagina, for the reason that the denudation has been almost entirely within the vagina (on the pelvic floor) where the laceration originally occurred. The stitches have been introduced well within the vagina and have

FIG. 132.



Sutures for closing the superficial perineum and fourchette. The anterior suture is called the "crown suture."

FIG. 133.



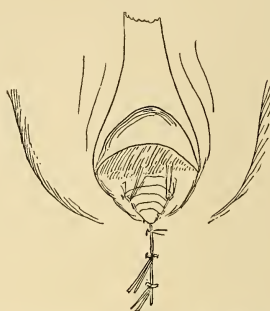
Emmet's operation of perineorrhaphy completed. Compare this figure with that representing the condition of the parts before operation (Fig. 119).

been so placed as to drag all the relaxation into the canal from which it originally came (Figs. 133 and 134).

*Rupture of the Recto-vaginal Septum.*—In complete rupture of the perineum the septum between the genital and the alimentary canals is broken down for a variable distance, and both possess a common outlet. The tear extends from the posterior commissure of the labia back through the perineum and the sphincter muscles into the rectum and for a variable distance up the rectum and vagina. This injury may vary from a superficial tear, barely involving the

sphincter muscle, to a rupture extending one or more inches up the septum toward the cervix.

FIG. 134.



Speculum introduced into the Vagina, showing the result of the operation.

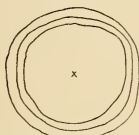
One of the commonest causes of rupture of the recto-vaginal septum is rapid delivery of the child's head with forceps, thus bringing the head down upon an insufficiently relaxed outlet, and substituting a hasty delivery, accomplished during a few pains, for nature's slow equable dilatation attained only after a great number of descents of the head, each time wedging the orifice a little farther open. The rupture in these cases begins at or within the posterior commissure, and extends rapidly back over the skin perineum, and through the sphincter into the anus and up the septum. A head, unusually large, or one which has not been susceptible to moulding, or one persisting in the occipito-posterior position, are all frequent occasions of this injury.

The immediate dangers from sepsis are great in these cases, as in all difficult labors involving delay, because of extensive injury to the soft parts, more or less prolonged manipulation, and especially the subsequent constant contamination of the lacerated area by fecal discharges.

**SYMPTOMS.**—The common symptom is incontinence of feces and flatus. Where the rupture has merely extended through the sphincter or but a short distance beyond, it is possible for the subsequent contraction of the scar-tissue, forming between the two ends, to so bind them together and give the sphincter muscle a *point d'appui*, that it will remain functionally active and no feces will

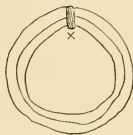
escape, and sometimes the patient will control even the flatus. It is important to recognize this fact, as writers have positively asserted

FIG. 135.



Normal Sphincter; no break in the continuity of the circular fibres.

FIG. 136.



Slight Solution of Continuity in the Sphincter filled in with connective tissue. No impairment of function.

that with every tear of the sphincter its function is necessarily abrogated. We must be prepared, therefore, to meet lacerations of all degrees—shallow tears in which the sphincter's function is not apparently interfered with, those which are deeper but in which

FIG. 137.



Solution of Continuity imperfectly bridged over with connective tissue. Partial loss of function.

FIG. 138.



Sphincter completely Ruptured. Divided, ends being widely separated. Complete loss of function.

some control of feces is still retained, and still others in which there is a complete tear resulting in absolute incontinence, the flatus escaping and the patient soiling herself as soon as the desire for evacuation is felt.

**TREATMENT.**—The only successful plan of treatment is reunion of the torn surfaces by suture. Such an expectant plan as binding the knees together and restraining the patient's movements after confinement, is to be rejected as worthless. In all these cases the immediate operation is called for within twenty-four hours after the labor. If performed aseptically, this operation will generally be successful.

**THE IMMEDIATE OPERATION.**—If the patient has been greatly exhausted by the confinement, or if the physician is not prepared to perform the operation properly at that time, he may delay six, twelve, eighteen, or even twenty-four hours, before proceeding to unite the tear. The operation may be performed at once or after



the patient has had a refreshing nap and some stimulation administered. She is laid transversely across the bed with the hips resting on the edge on a perineal pad, which drains into a bucket. If the bed has a spring or woven-wire mattress, and the centre sags so much as to prevent free drainage, a board similar to the fracture-board used in hospitals should be inserted beneath the springs. It is not necessary to give an anesthetic unless the patient be so nervous as to be unable to control herself, as a traumatism which has been sufficient to cause the rupture will also produce partial anesthesia of the soft parts by pressure. A little moral suasion by the physician will often quiet a nervous woman sufficiently to secure her intelligent co-operation during the operation. The patient will sometimes be able to hold her own legs flexed upon the abdomen, by placing one hand under each knee, but it is always better to employ some form of leg-holder, if at hand, as it relieves her of the tension. The leg-holder described in the chapter on Technique is the one which is best employed. A competent nurse or assistant with clean-washed hands stands by the operator ready to assist.

The vagina and external parts are prepared as is usual for plastic operations. The surgeon takes his seat in front of the patient, so that his shoulders are almost on a level with the vulva. His instruments are spread out in an orderly manner on a low table to his right, on a clean sterilized towel, or in a tray, covered with hot water. To his left is placed a basin of warm water for occasional cleansing of his hands. An irrigator containing two quarts of water at a temperature of about 110° F. hangs back of him three feet above the level of the bed.

As the operator separates the labia with his left hand, the assistant directs the water on the parts which at the same time he gently sponges with pledgets of absorbent cotton.

The extent of the tear into the rectum and up into the vagina must be carefully noted. Ragged tits and tissue which resemble large blood-clots must be trimmed off evenly with a pair of sharp scissors.

The next step in the operation may properly be called the reduction of the compound and complicated laceration to a simple form of tear, by closing the rectal part of the rent. This is accomplished by passing a number of interrupted catgut sutures, beginning at the angle and extending down to and including the ends of the sphincter, each entering and emerging on the torn rectal mucous

membrane and penetrating the septum one-eighth of an inch, which is deep enough to secure a firm hold. These sutures are then tied from above downward and the ends dropped into the rectum. There then remains but the edges of a deep perineal and vaginal tear to be approximated. This is repaired by deep sutures of silkworm-gut, beginning in the vagina at the upper angle and passing down over the commissure on to the perineum and to the anus. Each suture extends to the bottom of the tear. They are tied from above down, as introduced.

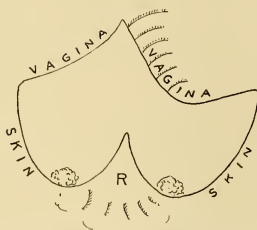
The lowermost external suture must enter and emerge well behind the divided ends of the sphincter, sweeping deeply around in the septum, thus binding the sphincter ends firmly together. About four silkworm-gut sutures to the inch are sufficient. The patient should lie quietly in bed, but she need not be restrained from turning over gently or lying on her side. The bowels, instead of being locked, should be opened freely on the second day by a laxative, followed, if need be, by an enema given with extreme care. If an enema be ordered, careful directions as to the introduction of the nozzle of the syringe should be given to the nurse, as great injury may be done by its careless use. The nozzle should be introduced gently, passed back toward the sacrum, and then the contents of the syringe slowly injected. After the bowels are opened, a mild laxative should be administered every day or so, as the fecal discharge must be kept soft and straining at stools prevented. The vulval orifice and the perineum should be well sprinkled with iodoform and boric-aid powder (1 : 7) and protected by a pad of sterilized absorbent cotton loosely applied and renewed three or four times daily. In eight or ten days the stitches should be removed with the patient in the same position as at the operation. The sutures are removed by drawing each to one side and cutting its loop, and then by pulling it toward the side on which the loop is cut.

*The Intermediate Operation for Complete Tear.*—During the process of granulation and formation of the cicatrix the wound of a complete tear presents essentially different conditions to the operator from those found either immediately after the reception of the injury or later in the secondary period, when the scar-tissue has been fully formed. From the seventh to the fourteenth days the wound-area is covered with delicate friable granulations, and its margins are marked by pink lines, which contract until finally only a linear

scar remains. The operation at this stage may be performed with ease, and is followed by good results. The patient is brought, as before, to the edge of the bed and the parts thoroughly sterilized. A pledget of cotton saturated with a 10 per cent. solution of cocaine hydrochlorate is laid over the whole lacerated area. In ten minutes the operator may take his seat in front of the patient, and with his thumb in the rectum and his finger in the vagina draw one side of the torn area into view and thoroughly denude it down to healthy tissue by scraping off all the granulations with a sharp scalpel. The older the wound the greater will be the difficulty of denuding its margins properly, and in some cases a sharp pair of scissors will be necessary to complete this part of the denudation. A freely-oozing surface with sharp margins is now exposed. The sutures are then passed as in the immediate operation.

*Secondary Operation for Complete Tear.*—The secondary operation is performed at any time after the formation and contraction of the scar-tissue are completed. It must be remembered, as it bears an essential relation to the denudation to be made, that the area of scar-tissue at this stage by no means represents the area of the

FIG. 139.



Rupture of the Recto-vaginal Septum: Ends of the denuded sphincter shown at the sides of the rectum.

original injury. The broad primitive wound-surface has contracted down into narrow lines more or less  $\text{>—<}$ -shaped, the lower extremities representing the position of the sphincter ends, the upper the commissure, and the transverse bar the lower margin of the recto-vaginal septum. The denudation must, therefore, be made to cover an area widely exaggerating the outlines of the scar-tissue.

The sphincter area is generally characterized by a shallow pit, often marked by little dimples at either extremity of the septum,

which presents a more or less sharp border, and beneath which pout a few fitts of the deep-red rectal mucosa. Not infrequently this pouting is considerable, and has often been mistaken for hemorrhoids.

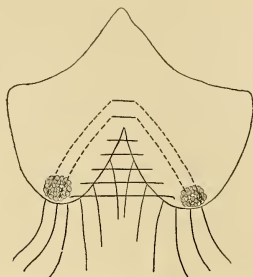
Before making the denudation the outlines of the area to be denuded must be mapped out with the point of a scalpel. This allows a rapid denudation to be made, without the error to which one is liable in making a free-hand denudation with the scissors alone. The first line may be made around the septum, splitting it at the rectal margin, and including both sphincter ends; this line is continued up on each side in a curve, convex backward to the nymphæ; from this point lines on both sides sweep into the vagina, along the lateral walls, until they meet in a point up in the vagina a half inch or more above the tear in the septum (Figs. 140 and 143).

The denudation is rapidly made with a pair of curved scissors and a tenaculum or rat-toothed forceps. The lower parts should be denuded first, so that that which follows is not obscured by the blood. The tissue is removed in long strips until the whole area is thus freshened.

The sutures are introduced much as described in the immediate operation. First, interrupted catgut sutures closing the rectal side of the tear from the angle down to the sphincter, radiating out on to the skin surface. The ends of the sphincter muscle are thoroughly exposed until muscular fibres are plainly visible. A tenaculum is hooked into each end of the muscle and the two ends brought together. A small catgut ligature is thrown about each end of the muscle and the free ends of the catgut securely tied. The muscle ends are thus surely approximated with no possibility of any other tissue coming between and preventing their union. The ends of the sphincter muscle are held together, and the catgut relieved of a tension it cannot stand by two silkworm-gut sutures introduced on the skin surface well behind one of the divided ends of the sphincter, passing directly through the end of the muscle itself, sweeping up around the septum-tear into the vagina, to emerge in the vaginal septum at a point well above the upper end of the septum-tear. The sutures are reintroduced at a point a slight distance from their point of exit, carried down the vaginal septum on the opposite side of the septum-tear, pass through the torn end of the sphincter and emerge on the skin surface at a point directly opposite that of their original entrance (Fig. 141).

The remaining sutures are passed, beginning at the upper angle of the denudation in the vagina, by introducing silkworm-gut

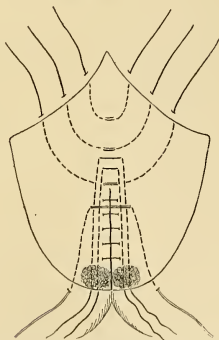
FIG. 140.



Rectal Sutures in Place, also supporting sutures passing through ends of Sphincter Muscle.

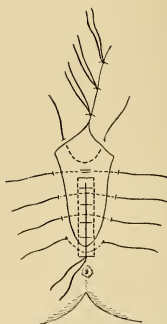
sutures about four to the inch, and extending from the vaginal mucosa down to the bottom of the septum. These sutures enter and emerge on the vaginal mucosa. They extend seriatim from

FIG. 141.



Rectal Sutures Tied, and Sutures supporting ends of Sphincter Muscle in place; also Vaginal Sutures.

FIG. 142.



Sutures within the Vagina Tied; external or skin Sutures in place, lowermost one passing through end of Sphincter Muscle; supporting suture tied.

the upper part of the vaginal denudation down over the commissure on to the skin to the lowest point (near the rectum) of the denudation. The lowest of these sutures is made to pass well behind and through the ends of the sphincter muscle, giving additional support and security against retraction (Fig. 142).

Before beginning the denudation it is necessary to first thoroughly stretch the sphincter, with the object of elongating it as much as possible, and to prevent its spasmodic contractions the first few days following the operation. When the operation is completed the parts should be sufficiently relaxed to allow of the easy entrance of the

FIG. 143.

FIG. 144.

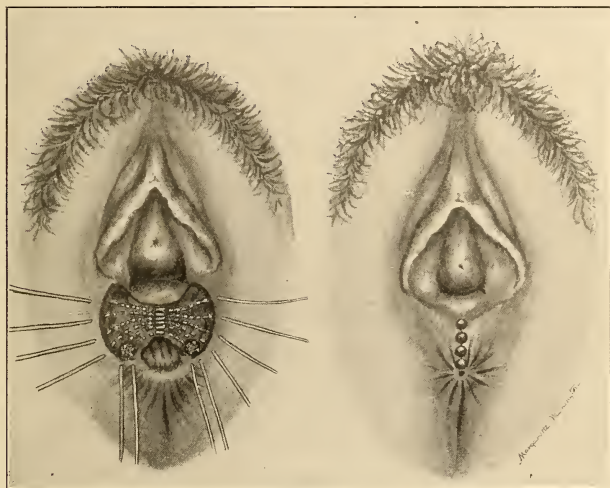


FIG. 143.—Denudation and sutures for repair of laceration. The two posterior sutures pass through the sphincter muscle.

FIG. 144.—Completed operation. The anal opening is surrounded by the sphincter. One shot has disappeared in the anus. The anterior suture is omitted.

little finger. Should the new sphincter be so tight as to make this in any way difficult, the operation will almost inevitably fail unless the tightness is at once overcome. A small tenotomy knife may be introduced through the skin directly over the posterior edge of the sphincter muscle, and its fibres divided by subcutaneous section to an extent to allow of stretching the sphincter sufficient for the easy introduction of the finger into the rectum. The most prolific causes of failure of this operation are neglect to secure proper stretching of the sphincter muscle and accurate approximation of the muscular ends.

After the completion of the operation the urine should be drawn, the vagina cleansed of blood and dried out with pledgets of absorbent cotton, iodoform and boric-acid powder sprinkled over the sur-



face and between the lips of the vulva, and a pad of loose absorbent cotton laid between the thighs and held in place by a T-bandage. The urine should not be drawn after the operation unless the patient is unable to pass it. Each time after urinating the vulva should carefully be dried with absorbent cotton, and powder, and fresh cotton applied. The bowels should be opened not later than the third, preferably on the second day, and should then be kept open by a daily evacuation. The patient should take a purgative pill or saline purge, followed by an enema in six or eight hours, if a natural soft movement does not follow. Extreme care must be observed in giving the enema not to allow the point of the syringe to impinge on the stitches in its introduction.

It is not necessary to bind the limbs ; on the contrary, considerable liberty of movement may be allowed without separation of the legs. The sutures should be removed, as in the preceding operations, in from eight to ten days.

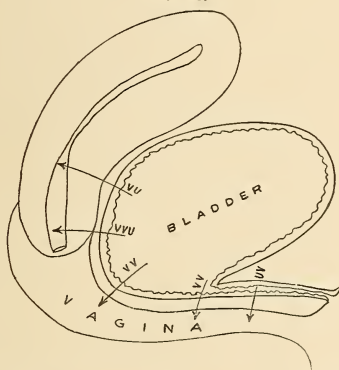
## GENITAL FISTULÆ.

GENITAL fistulæ are abnormal avenues by means of which some portion of the urinary tract or the bowel communicates with the genital tract or the exterior of the body.

Fecal fistulæ are formed by a communication between the rectum or the small intestine, and the uterus, vagina, or bladder.

Urinary fistulæ are formed by a ureter emptying into the

FIG. 145.



The Various Forms of Vesical Fistulæ; *v, u*, vesico-uterine; *v, v, u*, vesico-vagino-uterine; *v, v*, vesico-vaginal; *u, v*, urethro-vaginal.

uterus or vagina, by the bladder discharging into the uterus or vagina, or by an opening from the urethra into the vagina.

### URETERAL FISTULÆ.

Ureteral fistulæ are sometimes congenital, discharging low down near the external urethral orifice: they commonly arise, however, from severe labors in which the laceration has extended through the cervix and beyond into the vault of the vagina and out into the broad ligament, tearing the ureter, or they follow a vaginal hysterectomy. After granulation and cicatrization are completed the

ureter will be found discharging into the uterus or vault of the vagina.

**DIAGNOSIS.**—This can be made by watching the os uteri, or the small orifice in the vault of the vagina, when the urine will be seen discharging at intervals of a few seconds to a minute or more, in small jets. The patient complains of a constant discharge of urine, and yet she voids the urine which collects from the other kidney at regular intervals. The injection of an aniline solution into the bladder brings no corresponding discharge from the fistula; on the contrary, its discharges remain clear. Especial care must be taken not to be misled in the diagnosis when a vesico-vaginal fistula, constantly draining the bladder, exists with a uretero-uterine fistula. If the ureteral orifice can be seen and a catheter introduced, it passes in the direction characteristic of the ureter; that is, to the back part of the pelvis and up toward the pelvic brim, and possibly over the brim toward the kidney. The intermittently flowing urine can be collected from the outer end of the catheter.

**TREATMENT.**—The cure of a ureteral fistula is a matter of considerable difficulty, and should only be undertaken by a surgeon of considerable skill in plastic work.

When the ureter empties into the uterus high up out of sight, the corresponding kidney has been extirpated by some surgeons as the only means within their power of relieving the patient from the constant flow. The sacrifice of the kidney, however, is a procedure repulsive to the surgeon for the relief of a condition apparently so trivial. A better plan is the following: The patient is placed in the left lateral or the dorsal posture, and the posterior vaginal wall retracted with a Sims speculum. The anterior lip of the cervix is caught by a pair of bullet forceps and the uterus drawn down. If it is not evident, on account of the deep cervical laceration and the scar-tissue, on which side the fistula lies, the cervix is split up until the orifice is visible. If the side on which the fistula is located can be detected, the cervix is separated for half or two-thirds of its extent from the vaginal vault and gradually drawn downward. The cellular tissue is slowly and carefully peeled up on that side until the ureter is found at the fistulous orifice.

After freeing the ureter for from a half to one inch out into the cellular tissue, it is severed from its uterine attachment. An antero-posterior incision is made in the supravaginal portion of the bladder about half an inch long. The end of the ureter is cut off quite

obliquely and turned into the bladder, and the sutures so inserted as to retain the ureter in place. The first is passed so as to catch one side of the incision except the mucosa, enough of the under wall of the ureter to hold it, and the opposite side of the incision. The next suture catches the bladder-walls a little more superficially, but includes the ureter in the same manner. Each of the following sutures proceeding from below upward is passed more superficially until the upper limit of the incision is reached. Care must be taken not to narrow this part of the incision so as to compress the ureter. Two or three superficial sutures catching the bladder-wall and outer coat of the ureter complete the union on all sides. The incision in the vault of the vagina is then closed by fine silk or silkworm-gut sutures, or it may be packed loosely with iodoform gauze.

Or the abdomen may be opened, the ureter traced from the point where it crosses the pelvic brim to its entrance into the uterus, liberated at this point, dissected up for an inch, and bladder implantation performed as described in the chapter on Diseases of the Urethra, Bladder, and Ureters.

Uretero-vaginal fistulæ may be closed by passing a sound into the ureteral orifice and dissecting up the ureter for about a third of an inch, opening the bladder just above the end of the ureter, turning its end into the bladder, and closing the incision by sutures on the vaginal side.

Another method is to open the bladder close to the ureteral orifice, and pass a catheter through the urethra and bladder and through the opening into the ureter. The short portion of the catheter visible in the vagina is then shut in by an oval denudation embracing both vesical and ureteral openings. Careful transverse union with deep sutures of silkworm-gut and superficial sutures of silk then establish the channel of communication between ureter and bladder.

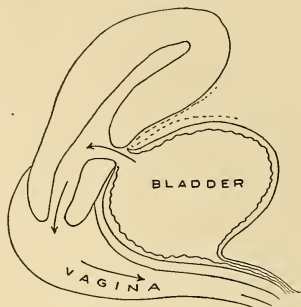
#### VESICAL FISTULÆ.

Vesico-uterine fistula; vesico-utero-vaginal fistula; vesico-vaginal fistula.

*Vesico-uterine Fistula.*—In this form of fistula there is a direct communication between the bladder and cervical canal, so that the urine escapes constantly through the os uteri externum. The demonstration of the vesical involvement can easily be made by injecting a colored fluid into the bladder, when it will be seen to escape from the cervix.

TREATMENT.—The musculo-fibrous tissue forming the cervical canal has a remarkable tendency to contract and close spontaneously any fistulous opening arising from a severe labor. If, therefore, but a short time has elapsed since the receipt of the

FIG. 146.

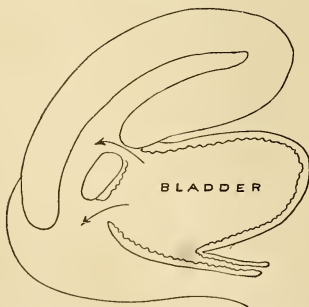


Vesico-uterine Fistula. Course taken by the urine indicated by arrows.

injury, the operator can well afford to wait a few weeks or months until he sees what nature alone will be able to accomplish.

Persistent fistulæ may be closed one of three ways: Where the

FIG. 147.



Vesico-uterine Fistula divided into two channels by a Septum of Scar-tissue.

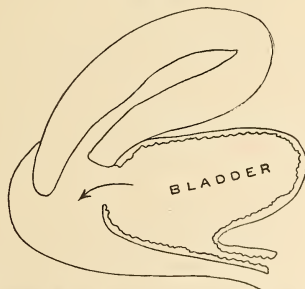
fistula is situated high up in the uterus and the amount of cicatricial contraction in the vagina prevents a proper exposure, the abdomen may be opened in the median line just above the symphy-

sis pubis, the uterus drawn out of the incision, the peritoneum incised transversely at the vesico-uterine fold, and the bladder carefully dissected from the uterus until the fistula is reached. The bladder should be emptied, the fistula cut through, and the opening in the bladder closed by a series of interrupted silk or fine catgut sutures, four or five to the half inch, including the whole wall down to the mucosa. The edges of the opening in the uterus should be freshened and drawn together by a row of interrupted silk sutures. After carefully cleansing the field, the peritoneum may be re-attached to the uterus, the field of operation entirely concealed, and the abdomen closed.

The *second method* is the reverse of the first, in that the vaginal vault is incised in front of the cervix, and the dissection carried up between the bladder and the uterus until the fistula is severed. This is closed by a row of interrupted silk sutures through the thickness of the bladder-wall, exclusive of the mucosa. The uterine opening may be left to itself, and a small strip of iodoform gauze pushed up, anterior to the cervix and under the fistula. The vagina is also loosely packed with gauze, which is renewed in three or four days. At the end of a week the pack is left out and a daily vaginal douche of a warm boric-acid solution given.

In the *third method*, where the fistula lies near the vault of the vagina the cervix may be split up into the track of the fistula,

FIG. 148.



Vesico-utero-vaginal Fistula, in which the posterior lip of the cervix is destroyed.

which is freshened from the bladder to the uterine surface. If necessary, sufficient cervical tissue should be cut away from the sides of this incision, so that the denuded fistula forms the apex of



a wedge, and is closed when the sides of the cervix are brought together. Two to four silkworm-gut sutures are passed through from the vaginal surface of the cervix, and when these are tied the fistulous area is efficiently closed. The sutures should be removed in about ten days.

*Vesico-utero-vaginal Fistula*.—In fistulæ of this character the opening is at the cervico-vaginal junction in front, median, or to one side of the middle line. The neighboring cervical tissue is cicatricial, and there is usually marked loss of substance. Where there is much cicatricial tissue in the cervix, it is best to draw the cervix downward and backward and dissect the bladder with the fistula free from the uterus, for a short distance above the vaginal vault. The fistula should then be treated by making a denudation extending from the vesical mucosa out on to the vaginal surface about a quarter of an inch broad.

If the fistula is transverse to the axis of the vagina, the tissue above should be brought down to the tissue below by a row of silkworm-gut sutures, entered a short distance off from the denuded surface and passing down to the mucosa of the bladder. These sutures should be passed about five to the inch. They should be brought snugly together without constricting the tissues. Where the tissue pouts between these deeper sutures, the work of approximation may be completed by superficial silk or fine catgut sutures. If the long axis of the fistula is in the axis of the vagina, the stitches should be passed from side to side.

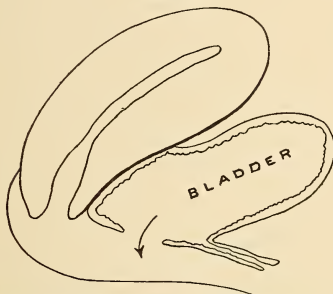
*Vesico-vaginal Fistula*.—A direct fistulous communication between the bladder and the vagina is the classical affection, brought within the reach of the surgeon's skill by the labors of Sims and Emmet. These fistulæ arise from protracted labors, in which the fistulous part of the bladder has been compressed sufficiently long, between the head of the child and the symphysis pubis, to produce a slough, which comes away in from three days to a week after labor, leaving the artificial opening. They may also arise from direct injury of the tissue while using the forceps; they are more often the consequence, however, of the want of the forceps to obviate the delay. They have also followed unsuccessful operations of the surgeon on the anterior vaginal wall.

These fistulæ vary in size from a pin-point to one or two inches in diameter. The small ones are often the remains of an unsuccessful attempt to close a larger fistula. In form, a vesico-vaginal fistula

is round, oval, or irregular. One of the most important complications of the condition is a cicatricial contraction of the vagina and the presence of cicatricial bands extending from the fistula out on to the vaginal walls.

**TREATMENT.**—When the vagina is contracted by scar-tissue, this must be divided in one or more places and so stretched as to afford an ample exposure of the fistula. The attempted closure of the

FIG. 149.



Vesico-vaginal Fistula; bladder adherent to the uterus along the darkly-shaded line.

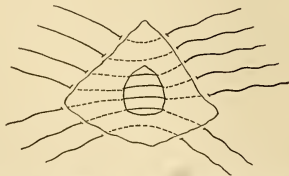
fistula will succeed in direct ratio to the satisfactory exposure, which allows every step of the operation to be accurately conducted.

If the vagina is eroded and coated with phosphatic concretions, this must be relieved by weak warm boric-acid douches—about a teaspoonful to the quart—and the erosions are touched occasionally with a solution of nitrate of silver, about 5 or 10 grains to the ounce. The operation can most conveniently be performed with the patient in the lithotomy position, with well-flexed thighs held up on the abdomen by a leg-holder, and with the buttocks resting on the perineal pad for drainage. The posterior vaginal wall is then retracted with a Sims speculum. The denudation of the margins of the fistula is made by marking with a sharp knife the outer limit of the area to be denuded, from a quarter to an eighth of an inch from the edge of the fistula. With a fine right-angled tenaculum or with a pair of long fine rat-tooth forceps the operator catches hold of a piece of the tissue thus outlined, lifts it up a little, and proceeds to denude the whole down to the mucous membrane of the bladder. The denudation may be accom-

plished with a sharp small-bladed knife, but it will more easily be made by means of a long pair of scissors, with delicate blades that come to a sharp point, and are slightly curved on the flat surface. No undenuded islets of tissue should be left to interfere with the union after approximation. The direction in which the tissues should be brought together depends upon the form and the size of the fistula. In the case of small fistulæ it is immaterial; in circular fistulæ the vaginal tissue yields most readily in drawing the upper border down to the lower, shortening the vagina, and placing the scar across its axis. A long, oblique fistula should be approximated in the direction of its long axis. The edges of a round fistula cannot be accurately brought together, and it often becomes necessary to dissect out a V-shaped piece at each end of the fistula, thus rendering the opening elongated and its edges easy of approximation. Two sorts of sutures should be used in approximating the denuded margins—silkworm-gut for the deep, and fine silk for the superficial stitches.

The sutures are applied by means of a small curved needle with a silk loop as a carrier. The first one may be placed at either end or, often conveniently, in the middle. If the fistula is a large one, the suture may be tied at once, thus facilitating even closure on both sides of it. Each silkworm-gut suture should enter the vaginal mucosa from an eighth to a sixteenth of an inch from the edge of the denudation, and appear at the margin of the mucous membrane of the bladder, to re-enter at the mucous margin on the

FIG. 150.



Operation for Vesico-vaginal Fistula. Stitches introduced preparatory to closure.

opposite side and reappear on the vaginal mucosa at a point corresponding with the point of entrance. No suture should penetrate the mucous membrane of the bladder where it is liable to become the point of a future fistula. Five or six similar sutures to the inch should be inserted, and one at or just beyond each angle.

These sutures should then be brought together and tied snugly, approximating the tissues without strangulation. The pouting tissue between these deep stitches can be approximated by fine silk or cat-gut sutures.

The ends of the sutures should be cut about half an inch long, and a loose iodoform gauze pack placed in the vagina. Should there be any tension whatever upon the sutures, longitudinal incisions must be made deep in the scar-tissue on both sides of the fistulous opening until all tendency to tension is relieved. These incisions should be made short, so that they may be closed by stitches introduced in the direction of their long axes, thus further relieving the tension. This precaution is oftentimes absolutely necessary to the success of the operation.

Under no circumstances should a sigmoid or other catheter be placed in the bladder for permanent drainage.

For the first three days the patient should be catheterized every three hours, after which she may be allowed to void her urine, taking care not to hold it longer than six hours, until the sixth day, when she may be allowed to pass the night without waking. In the case of small fistulæ the patient may void her urine from the very first. If the vaginal pack becomes wet or soiled, it should be removed at once, otherwise it may be left in place for two days, when it is removed and the vagina allowed to remain empty. It is not necessary to use a vaginal douche at any time unless there is a discharge from the vagina. All the sutures should be removed in from eight to ten days.

*Urethral Fistulæ.*—A fistula following labor and involving the urethra is usually small and of its interior half—that part projecting into the vagina. Fistulæ in the long axis of the urethra are at times made artificially by Emmet's operation to relieve vesical tenesmus. In closing the fistula, if small, the denudation may extend in a circle around it in a manner similar to the vescio-vaginal fistula; if large, a wedge-shaped piece may be cut out of the under part of the urethra with the fistula at its base, and the denuded surfaces brought together by silk sutures, extending down to the mucosa and applied closely and with extreme accuracy.

#### FECAL FISTULÆ.

Fecal fistulæ are abnormal avenues for the escape of the contents of the small or the large bowel, either by the vagina or by the

bladder. The fistulous orifice, having no sphincter, affords an avenue for the constant escape of fecal matter when the contents of the bowel are fluid. If the fistula is small, opening into the sigmoid flexure or rectum, and the contents of the bowel formed, the escape of feces occurs but rarely.

One of the commonest and most distressing symptoms of these fistulæ is the more or less frequent escape of the intestinal gases, which pass out with an audible bubbling or hissing noise, and by the evident odor so distresses the patient that finally she entirely avoids society and remains at home brooding over her ailment.

*Recto-vaginal Fistula.*—Recto-vaginal fistulæ are the most frequent; they consist in a communication between the rectum and the vagina through the recto-vaginal septum, at some point between the cervix uteri and the vulva.

Recto-vaginal fistulæ in the upper part of the vagina are not uncommon sequelæ of a cancer of the cervix uteri, and are due to a destruction of the upper part of the septum. In most cases of this class the disease is already in its last stages, and nothing can be done to cure the affection. The duty of the physician is limited to keeping the parts as clean as possible by repeated irrigations with warm water slightly medicated with boric or carbolic acid.

Recto-vaginal fistulæ in the lower part of the vagina and recto-vulval fistulæ commonly arise from imperfect union of the tissues after an attempt has been made to repair a complete tear of the septum. When these fistulæ are reduced to the size of a pin's head, the closure may be effected by stimulating the tract with cantharidis or with a little nitric acid.

Fistulæ may be closed by making a broad denudation, extending from the sound tissue, around and deep down into the fistula, and then passing sutures, one or two deep, of silkworm-gut, and the remainder of silk or catgut, from side to side, just as in a vesico-vaginal fistula operation. The sphincter ani should be thoroughly dilated so as to render the rectum temporarily incontinent. A loose iodoform gauze pack should be placed in the vagina. On the eighth day all sutures should be removed.

When the fistula extends close to the sphincter muscle or is bounded on its lower side by a thin band of cicatricial tissue, or is very large in diameter, the best course to pursue in its treatment usually is to cut through the sphincter muscle and thoroughly

denude the fistulous area, thus securing snug apposition throughout with greater ease and without constricting the tissues.

The suture and after-treatment of these cases are similar to those adopted in cases of complete tear of the septum.

When the small intestine opens into the bladder at some point within the upper pelvic cavity, the only plan of treatment is to open the abdomen, find the fistulous tract, and sever the adherent intestine from the bladder, taking care, when necessary, to sacrifice rather the bladder than the bowel. This part of the operation will usually prove difficult, owing to numerous surrounding adhesions among the bowels, which must be separated with pains-taking care. After loosening the knuckle of bowel from the bladder, each viscus should carefully be protected by thick pieces of gauze to avoid contamination of the surrounding peritoneum, and the openings, first of the intestine, then of the bladder, should be closed by sutures. If necessary a portion of the bowel can be excised and the ends joined together with the Murphy button.

The cure of fistula involving different parts of the genito-urinary tract requires the nicest kind of judgment and skill. These operations are the most delicate and difficult of plastic surgery and are not to be attempted lightly. It is only by the most conscientious work that satisfactory results will be obtained.



## DISTORTIONS AND MALPOSITIONS.

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DISTORTIONS AND MALPOSITIONS of the uterus may result from incomplete laparotomies or those in which drainage has been employed. Adhesions forming around the drain produce the most fantastic twists and bends in the uterus. Neoplasms and diseases of adjoining organs also cause flexions and displacements of the uterus. But such conditions will not be described here.

The more common forms of displacement are antelexion, retroflexion, retroversion, prolapsus, and inversion. It must be borne in mind that there is no position of the organ which is normal to all women. The uterus is a movable body, varying in its position in answer to the condition of the bladder, rectum, and other pelvic and abdominal organs. It must not be assumed, because a given womb be found with its fundus behind the long axis of the pelvis in a retroflexed or retroverted position, or before it in an anteverted or antelexed position, that the symptoms from which the woman is suffering come from the womb. Any of these positions may exist, and be perfectly natural and normal to a particular individual.

*Pathological Anteversion* is described by some authors, but we have never seen a case unless the uterus was displaced by a neoplasm, or adhesions or the distortion of some adjacent organ were to blame for the malposition. The uterus naturally follows the movements of the bladder, and is generally distinctly and normally anteverted when the bladder is empty.

### PATHOLOGICAL ANTEFLEXION.

This occurs in two chief forms. In simple antelexion the axis of the cervix and the cervix itself occupy a normal relation to the vagina. But the body is sharply bent upon the cervix. These uteri are found high in the pelvis, drawn up toward the promontory of the sacrum. The uterus is somewhat fixed in that position, downward mobility being limited. The result is that while the

woman is erect the entire intra-abdominal pressure falls directly upon the posterior aspect of the uterus and the condition is still more aggravated. Whether this flexion be due to inflammatory shortening of the utero-sacral ligaments thus drawing up the cervix is not proven, but possibly such is the case. The cervix is short and fairly well open, but sometimes stenotic. The sound often shows the depth of the uterus to be normal and the point of flexure to be at the internal os, or the whole organ may be of much decreased size (infantile uterus). The posterior wall opposite the flexure is

FIG. 151.

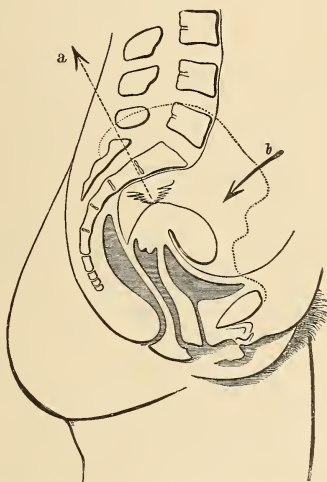


Diagram of Pathological Antelexion arising from contraction of the folds of Douglas: *a*, direction of the traction of the folds; *b*, that of intra-abdominal pressure.

thinned, while the anterior is thickened. The endometrium is usually atrophied and poor in lymphoid elements. This is the common picture. But instead there may be marked hypertrophy. The cervical canal has lost much of its slit-like form, and is more tubular.

**SYMPTOMS.**—The patient usually gives some such history as this: She menstruates regularly. A few hours before the flow appears there is a good deal of pain located behind the pubes, intermittent and crampy in character, or continuous, severe, and with spas-

modic exacerbations. A clotted flow appears which affords relief for a time. She uses one or two napkins the first day or so, and, after lasting two or three days, the flow becomes thin and watery. It is followed for a longer or shorter time by a milky discharge which is unirritating, but of disagreeable odor. When the patient is up she has to urinate frequently, but is not troubled at night. Upon examination the uterus is found high up, the cervix small, and the fundus is easily detected as a rounded nodule above the anterior lip. Rectal examination is exceedingly valuable in that it determines the absence of the fundus from its normal position. If it is necessary to use the sound, the instrument shows the flexure and its degree. Before being passed it should be bent to the apparent angle of the flexure, and no force should be used in its introduction. Downward traction on the uterus by a tenaculum lessens the degree of bend in the uterus and facilitates the introduction of the instrument. The cervical plug of mucus is opaque and milky or clear, seldom purulent. Secondary cervical erosion and inflammation is not common. The appearance of the cervix varies greatly in different cases. Commonly the external os is a rounded hole, and the cervix more or less conical. The narrowing of the canal may be so marked that a probe is with great difficulty introduced. This is of no great diagnostic importance, as it is rare that the outlines of the uterus cannot be detected by the bimanual touch. These cases are commonly associated with vaginismus in the unmarried and with dyspareunia and sterility in the married.

The other common form of ante flexion is still more interesting, and may be designated as *ante flexion with retroversion*. The body of the uterus occupies nearly a normal relationship to the bladder and the pelvic walls, or may be somewhat retroverted. The cervix is so sharply bent upon the body that its axis is the same as that of the vagina. It is always hypertrophied, and may at times even be so long as to project from the vulva. The whole organ is somewhat lower in the pelvis than normal. This condition is really one of hypertrophied cervix bent upon the body, with, possibly, some retroposition and descent of the latter. The greater the hypertrophy the more the descent and backward displacement of the body.

Examination shows the enlarged cervix, often with a conical end and a circular os externum. The body is not always felt per vaginam, but is readily found by rectal examination.

Because of the elongation of the cervix, together with the flexure, introduction of the sound is difficult. The total length of the canal is increased, but that of the body is about normal. If the organ be pushed high in the pelvis, the cervical elongation apparently decreases. The posterior lip is much longer than the anterior. The endometrium is the seat of hypertrophic changes, especially at the os internum.

It is an interesting fact that in all these cases of antelexion the bladder is attached to the uterus abnormally high.

So far, no attempt has been made to explain the pathogeny of these two lesions. That simple antelexion is associated with shortening of the utero-sacral ligaments is undoubted. Whether this shortening be congenital or acquired is most often not determined. Transverse sections of the child show that the os internum occupies a position relative to a line drawn from the symphysis to the end of the last sacral vertebra, much higher than in the adult. If any disease of infancy should decrease the elasticity of the utero-sacral ligaments, as the body of the uterus grows, the cervix being fixed, the body will fall forward on the bladder. The continuous force of intra-abdominal pressure, together with its increase by lacing, adds to the natural tendency the uterus has to bend. Also, when the organ is gorged with blood at the menses and the woman's body erect, with that pressure still more will it tend to bend.

In infancy the cervix is relatively large, but the hypertrophy accompanying certain flexions cannot be accounted for. It is utterly unlike any that occurs as the result of inflammation in the adult organ. The process is probably begun even before birth or in early infancy. Inasmuch as the cervix is first developed, the explanation may be found in some stimulus, giving this an impetus too early or too strong, resulting in unbalanced growth later on.

These patients have more flow than those suffering from simple antelexion, and the pain is not so great; the blood does not clot as much. There is the same leucorrhea, and more of it. Backache and pelvic tenesmus are often present. Vaginismus and local nervous disturbances are common. The married are frequently sterile.

An explanation of the symptoms is here called for. The dysmenorrhea is due, not to the obstruction to the flow of blood, as stated by some authorities, but generally to the manner in which the flow is produced and the character of the blood. The epithelium,

instead of melting off, comes away in blocks and shreds. Casts of whole follicles may form. The blood is produced in too sudden a manner at first, and is sparsely mixed with lymphoid cells, and hence coagulates, instead of remaining fluid. The pain is produced because the endometrium is altered in essential particulars and because of the blood-clots. In those cases where the blood clots least the dysmenorrhea is least. It is to the altered condition of endometrium that the dysmenorrhea is due. The vaginismus and dyspareunia are purely secondary and dependent upon the nerve-irritation produced by the dysmenorrhea.

The subject of *sterility* of uterine origin can be dismissed in a few words.

Women with these flexed uteri who marry early in life, before the endometrium has undergone the structural changes described under the head of "Simple Endometritis"—conceive as readily as other women, although they may suffer from the most severe dysmenorrhea from clotting of the blood. It is as illogical to assume that a canal which admits a Simpson sound will refuse entrance to a spermatozoon, as that a spermatozoon may penetrate the minute Fallopian opening and yet not be able to enter the cervical canal in such cases as these under discussion. The obstruction theory of Sims and his followers will not meet the objections raised by more recent physiological and pathological investigations. The whole fabric of the uterus is made for the proper management of the decidua-forming endometrium. If this be markedly and generally diseased, its chief function is gone. The requirements on the part of the woman to conception are—patent tubes, discharge of an ovule, melting off of the epithelium from the surface of the endometrium, and engorgement of the rectiform tissue by lymphoid elements. If these requirements are not satisfied, conception does not occur. Flexure possibly produces degenerative changes in the endometrium, but it is those changes, and not the flexure, which prevents conception. Most frequently, however, the changes are brought about by induced inflammations.

Therefore, with a wrong interpretation of the menstrual function, and seeing but the grosser lesions, gynecologists have been but partial in their treatment of these lesions and the attending sterility.

TREATMENT.—The indications seem to be to relieve that lesion which produces the changes in the endometrium and give the woman

a new cytogenetic membrane. In the first form of ante flexion the uterus is dilated thoroughly and washed out with boracic-acid solution. Now comes the essential part of the operation, for which the dilatation is merely preparatory. As thoroughly as possible the whole inside of the uterus is curetted, removing every possible vestige of the endometrium. The cavity is again washed out. Iodoform gauze is then tightly packed into the uterus and the vagina lightly filled with the same, this being left in four days. It is then removed and no further treatment given.

The operation is best done two weeks before a period. The patient is allowed out of bed on the third day; she should remain in the house two or three weeks. If the operation is done for sterility, and if there be no suspicion of gonococci in the husband's urethra, connection should take place two days before and immediately after the menstruation. No pessary is used or needed.

*Ante flexion with retroversion* is treated on the same principle—removal of the endometrium and relief of that condition which originally produced it. Here the latter is more difficult than in simple ante flexion. The uterus is steadied by the bullet forceps, and not drawn down much; the canal is dilated cautiously, to half an inch; after this the uterus is washed out, thoroughly curetted, again irrigated, and packed tightly with iodoform gauze, and the usual vaginal dressing applied. The packing is removed on the fourth day, and a light drain of gauze introduced just through the internal os; no pain is produced. This second dressing remains in two days more, and another is applied. The drains should be introduced for two weeks. The curettage is the important feature. Pessaries are out of place in the treatment. If, as is usually the case, the cervix be hypertrophied, it is at times impossible to sufficiently dilate so that an effective curettage can be done and the uterus properly packed. Besides, something must be done to do away with the enlarged cervix. This can be accomplished by the following method:

#### ANTERO-POSTERIOR SECTION OF THE CERVIX.

The cervix is pulled down into the axis of the vagina, and the length and shape of the canal determined by the sound. A blunt, straight bistoury is introduced to the internal os, and the posterior lip of the cervix is split for two-thirds of its length, the incision being in the middle line. The bistoury is now introduced again and the



anterior border of the internal os is nicked. The cervix is now carefully but thoroughly dilated and the uterine cavity curetted and irrigated with salt solution. The parts being wiped dry, the operator picks up the cervical mucous membrane at the old external os with his needle, brings out the needle upon the raw surface, and picks up the mucous membrane of the vaginal face of the cervix.

FIG. 152.



The congenitally enlarged cervix.

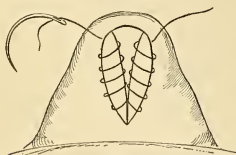
FIG. 153.



The shaded portions show the extent of the incisions.

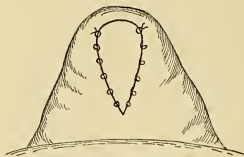
Tying the suture, it will be seen that the covering of the cervix is folded over the raw surface and is united to the cervical membrane. Using the suture as a continuous suture, the operator proceeds down one side of the incision and closes in the raw surface

FIG. 154.



The method of applying the running suture.

FIG. 155.



The completed operation.

entirely. When he gets to the angle or posterior part of the cut, he proceeds up the other side in a manner similar to that employed on the first, and upon arriving at the top the suture is tied. The cervical canal is now converted from the round tube which it first was to one of conical shape. The uterus is again irrigated and is packed with iodoform gauze. The vagina is also packed with gauze. All dressings are removed in two days and the vagina alone is packed. The patient is allowed out of bed in four days. The suture of silk is removed in about a week. After-treatment is unnecessary.

The cervix shrinks after this operation, so that after the lapse of a few months but little of the hypertrophied portion is left.

The uterus, relieved of the weight of the enlarged cervix, also rises in the pelvis and assumes a more forward position. Should the cervix be much elongated or hypertrophied, it should be amputated. Both the amputation and the curettage may be carried out at the same sitting.

If it be decided to amputate the hypertrophied cervix, not more should be removed than two-thirds of that which it is desired shall be the ultimate decrease in size. Atrophy incident to the operation will remove the rest.

There are still those in America who teach and practise the use of *stem pessaries*. Inasmuch as for years we were so placed that we could observe daily the results of their use, we feel qualified to speak on the subject. Those who use them consider the cervical stenosis as the objective point. Having made incisions of the cervix, the uterus is not washed out and is not curetted, but dilatation is done. The pessary is then introduced and retained in place by a cotton tampon in the vagina. It is removed in three days, and an application of iodine or carbolic acid made to the endometrium, and the stem again put back. If the uterus simply be anteflexed, the stem will stay in without support; but if the cervix looks out in the axis of the vagina, the stem must be retained in place. These stems are straight and are forced into place in the flexed canal. They act, according to those who employ them, by straightening the canal and establishing drainage. They keep the incised and dilated canals open without doubt, and, as they are left in during the menses, connection, and douching, the discharges are very profuse—more profuse, in fact, than before they were used; hence their advocates consider that they are draining away discharges, when in reality they are producing them. Success is obtained under their use, if at all, after six months' or longer treatment.

If sterility and dysmenorrhea were due, as maintained by nearly all stem-pessary men, to the stenosis, they should be at once cured by the operation. But these gentlemen treat the endometrium for a long time to "get the secretions healthy," they considering that spermatozoa will not live in purulent secretions, in spite of the fact that the emissions of every gleet man are filled with them. They do not know that the fault lies with the structurally changed endometrium. Their applications do some good,

but it is tardy and comes when the patient is about worn out with treatment. The percentage cannot be estimated accurately, but we have known so many inflamed tubes come from this treatment that we believe they do nearly as much harm as good. If used in a case of simple endometritis, that speedily becomes purulent.

The stem pessary requires months to accomplish a result ; it produces pus, it frequently causes inflammation in the tubes and peritoneum ; it does not drain, and it does not cure endometritis. The sole beneficial feature in this method lies in the application of iodine and carbolic acid. Contrast this procedure with that of curettage. We have seen conception follow within five weeks after a curettage, and it not infrequently results at the second or third period following the operation. There is produced no pus, there is no long treatment, there are no accidents, and the results are not infrequently immediate relief from the dysmenorrhea.

It but remains for us to say that the treatment of ante flexion by the stem pessary is not based upon accurate ideas of the lesion and the function of the endometrium, and is at times altogether irrational.

We repeat, the object of the whole operation is to give these women new endometria, forming under propitious circumstances, and as soon as possible to obtain conception in the married. In the unmarried the relief from the dysmenorrhea is often permanent.

There is another procedure which, while it has little effect upon the condition of the endometrium, affords temporary relief from dysmenorrhea. We refer to *dilatation* without curettage. The use of the dilator without ether is exceedingly painful in these sensitive women ; it is of but temporary benefit, and must be repeated many times ; it is done under conditions where exact asepsis is impossible, and therefore has attached to it the risk of infection ; and, furthermore, it occupies a middle position between *operation* and *treatment*, with none of the good results of the former, and all the dangers of the latter, in most hands. Long after-treatment of these nervous women is inadvisable, because it keeps constantly before them their malady. They become hypochondriacal and utterly miserable, and prone to magnify their really trivial troubles.

There are many cases where it is difficult to decide what operation to do. The three factors which guide us in the selection are the symptoms calling for treatment, the amount of cervical hypertrophy, and the axis of the cervical canal to that of the vagina, this being normally from about 50° to 60°.

In all intra-uterine manipulations the most precise asepsis must be observed, lest we convert a simple into a septic endometritis and extend a septic endometritis into a tubal or peritonitic involvement. A woman who has once had either complication occupies a position in society far different from one who has not, and goes through her life with the possibility of celiotomy ever before her.

With this caution we may say that dilatation may be done so as to do the patient no possible harm if the proper precautions are taken. Still, it is an undoubted fact that the instrument has been most recklessly used. If curettage is not adopted, dilatation once every month, a few days before menses, will give most patients much relief from pain. But our experience is that the method is applicable to cases of short cervix only. Certain of these cases of dysmenorrhea suffer so much that the use of narcotics is demanded. If the woman be plethoric, she should be put upon an almost exclusive vegetable diet for two weeks before her period. To relieve the spasmodic pain, the following is most useful in a single dose when the pain begins:

R. Chloral hydrat.,	gr. x ;
Tr. cannabis indica,	℥xv ;
Ext. gelsemii fld.,	℥ij ;
Aquæ,	ad f̄ss.

This dose should not be repeated within six hours, and the patient should be put to bed with the first dose.

If the flow is excessive after giving the first dose, Tr. cannabis indica in 10-minim doses may be given alone every three hours for six doses, or codeia gr.  $\frac{1}{2}$  and phenacetin gr. v may be administered in capsule.

The use of morphia is absolutely contraindicated, for with periodic suffering it is most easy to contract the morphine habit. To prevent the recurrence of the attacks at each period saline laxatives associated with a limited diet will do much.

#### ANTEFLEXION COMPLICATED BY THE MENOPAUSE.

When the menopause occurs in old maids with anteflexion, it produces a very distressing train of nervous phenomena which properly come to the attention of the gynecic surgeon. The fundus rapidly atrophies and leaves the cervix proportionally much en-

larged. The cervix also finally retrogrades, the nerves are caught and compressed in the shrinking tissue, and the discharges are retained. The os is but pin-hole in character, and the whole cervical canal much decreased in dimensions. These uteri are originally but poorly and irregularly developed, their owners go through life suffering from dysmenorrhea, and when the menopause comes the atrophy takes place irregularly. They are complicated by a simple endometritis. All the treatment that is needed is dilatation of the cervix. The curette and gauze packing are seldom required for the endometrium, but it is better to introduce a filament of gauze into the cervix, leaving it in for a week, with a gauze vaginal dressing. No after-treatment is necessary.

These cases are often subjected to the stem pessary and electrical current. Being high-strung, nervous, almost irrational creatures, long continued local treatment has a deleterious effect upon both their mental and moral qualities. Medicinal treatment can give them little or no relief. If surgical aid be refused it may become necessary to resort to opium in some form at each recurring monthly period. Such treatment, although effective, is exceedingly dangerous, and should only be practised when all else fails. Such methods of relief as are given in the chapter on Dysmenorrhea should be tried before resorting to the use of this drug.

#### LATERAL FLEXIONS.

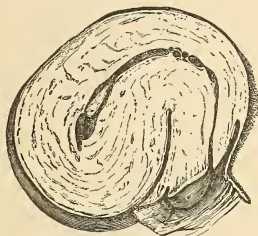
These are generally the result of some inflammatory lesion outside the uterus, such as adhesions, and of that common form of contraction in one broad ligament which follows puerperal septic salpingitis. They are not amenable to extra-peritoneal treatment, and are purely secondary.

#### RETROFLEXION AND RETROVERSION.

*Congenital retroflexion* is exceedingly rare. The uterus is invariably back in the pelvis and sharply bent upon itself, the flexure being at the os internum. The cervix is normal or slightly below normal in size. The flexure is exceedingly sharp, the fundus occupying the cul-de-sac. In rare cases no sulcus can be felt between the cervix and the body. If at any time there has been peritonitis, the body of the uterus is usually adherent to the rectum, rendering the deformity irreducible. The anterior wall opposite the internal os

is so thinned as to be membranous, while the posterior is much thickened. Schultze attempts to explain uterine flexures by ascribing them to intra-abdominal pressure acting upon the uterus at some point fixed by inflammatory tissue, and he describes a retroflexion due to fixation of the cervix anteriorly. The dilating and contracting bladder renders such a condition all but impossible. It is surely so where the flexure is congenital. So rare is this condition that Winckel describes but four cases. The uterus is close to the sacral curve and not lower than normal. It seems to be displaced directly backward. The fundus presses upon the rectum, and the total length of the uterine canal is decreased. All have some form of endometritis, often purulent. The ovaries and tubes are usually normal in position, and do not follow the fundus. The symptoms are uniform, with trifling variations: continuous, severe backache; pelvic tenesmus; difficult defecation and the passage of small stools; frequent headaches (occipital), especially

FIG. 156.



Extreme Retroflexion.

at the periods; dysmenorrhea, severe and identical with that accompanying antelexion, with a scanty flow and passage of clots. Bimanual examination reveals the direction of the canal. The bladder is attached to the uterus below the level of the internal os. Rectal examination, combined with abdominal palpation, detects the degree of flexure and the intimate approximation of the cervix and fundus.

**TREATMENT.**—The indications are for the removal of the endometritis and the establishment of thorough drainage. Replacement is impossible by the use of the sound or by manipulations, even under ether.

*The Operation.*—The posterior lip is incised through from above



the internal os; the uterus is dilated, curetted, and irrigated. The hemorrhage is free, inasmuch as the circular vessels are cut. To check this, a tight iodoform gauze tamponade is indicated, to be retained in place by vaginal gauze tampons for at least two days. It is then removed and vaginal gauze packing substituted. The treatment lasts for three weeks. With the short vaginæ and structurally altered uteri we cannot see how Alexander's operation or ventro-fixation could possibly be of benefit, and pessaries are worse than useless.

#### ACQUIRED RETROFLEXION AND RETROVERSION.

**ETIOLOGY.**—Retroflexions and retroversions accompanied by tumors will not be described. Their proper treatment is removal of the neoplasms, after which, if they still persist, they are to be dealt with as are other retrodisplacements.

Retroposition of the uterus may ensue as a result of conditions in its own tissues and from lesions in the supporting structures. Any factor tending to enlargement of the uterus, which at the same time softens its walls, may cause retroposition. Such are pregnancy, septic endometritis, and subinvolution. There is so much discrepancy in the relative frequency of retroflexion and retroversion given by different authors that it is impossible to furnish an accurate ratio. Retropositions are frequently found after the adnexa of both sides have been removed without adopting some means to retain the uterus in its proper position.

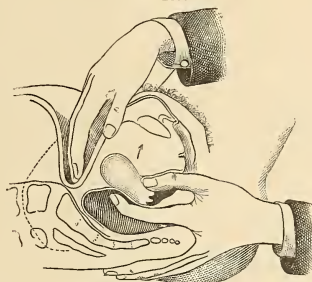
The cervix being more or less a fixed point, the heavy and softened body falls backward. A very common cause is too long confinement in the dorsal position in bed after labor, especially as the uterus is apt to be, under this circumstance, in a pathological state.

A sudden fall from a height, producing rupture of the round, broad, or utero-sacral ligaments, a sudden increase of the intra-abdominal pressure, as the body being crushed under a weight, may produce retropositions of the uterus by interference with its supports; or, they may be produced by a lesser and more gradual increase in the intra-abdominal pressure, operating for some time upon a softened uterus. But the common association of causes is a break in the pelvic floor, together with uterine enlargement.

The chief single cause is rupture of the perineum. The walls of the collapsed bladder completely fill the space between the

uterus and pubes; therefore displacement forward is possible to but a very slight degree. The perineum being torn, the sphincter ani does not feel the full opposing force of the levator ani in defecation, so more or less straining at stool becomes necessary. The result is that the feces, meeting the closed sphincter, seek a relief from the intra-abdominal pressure in the direction of the posterior vaginal wall, causing it to bulge forward. This drags on the posterior lip of the cervix, the uterine axis approaches that of the vagina, and the whole organ descends a little. If the uterus be enlarged as from a recent pregnancy, it will, yielding to the pressure from above, either fall backward or its fundus will bend upon the cervix, causing a flexion.

FIG. 157.



Ventre-recto-vaginal Reduction in Uterine Retrodisplacement.

Retroverted and retroflexed uteri are low in the pelvis, as the anteverted uteri are high up.

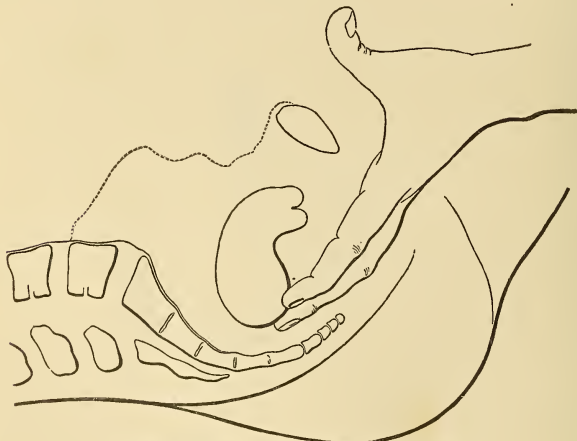
The element of intra-abdominal pressure is operating continuously, and may, apart from defecation, cause the displacements mentioned, where the supports are broken, more especially when there is a lack of tone in the uterine muscle.

Septic conditions, especially those acutely established in an aborting uterus, frequently result in acute retroflexions, which disappear in a few days if the sepsis is removed, and the uterine muscle regains its tone. Pelvic peritonitis and inflammatory processes in the tubes and ovaries also cause retropositions by the formation of false bands. Retroflexion and retroversion are usually accompanied by endometritis. Certain irregular changes take place in the muscularis, such as thinning of the anterior and thickening of the posterior wall. The broad ligaments are twisted and the venous circulation retarded,

leading to a varicose condition of the pampiniform plexus. This in time predisposes to prolapse of the ovaries and tubes. Retroposition is the first step to prolapsus.

**SYMPTOMS.**—Women with retroversion or retroflexion complain more of backache and a dragging sensation in the pelvis than of any other symptoms. These may be so great as to amount to actual inability to walk. Leucorrhea is a prominent symptom, the endometrial discharge being milky or purulent. As a result, erosions of the cervix may occur. In septic or inflamed uteri every movement

FIG. 158.



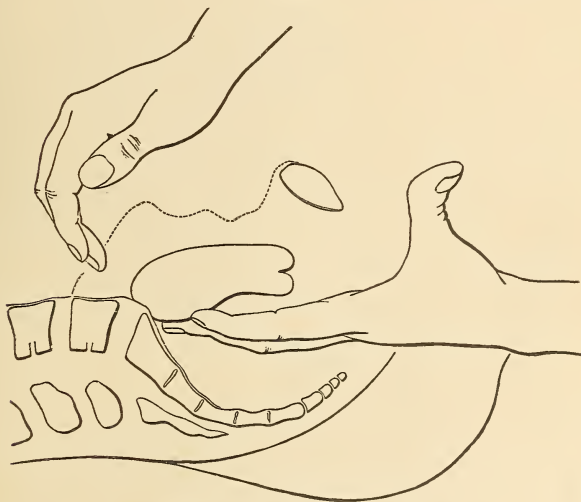
Bimanual Reposition of the Retroflexed Uterus: first step.

is felt in the tender organ. Defecation is difficult and often painful, hence postponed as long as possible. Costiveness results, with the common accompanying train of anorexia, foul breath, etc. Dragging upon the bladder sometimes causes the sphincter vesicæ to leak, and dribbling of urine occurs upon laughing or exertion. Pains down the front of the thighs are frequent, and are increased on motion. Occipital headache and burning pain in the nucha, inability to concentrate the thoughts, melancholia, hysteria, and peevishness are common reflex nervous phenomena. The endometrium commonly becomes hypertrophic, and gives rise to increased menstrual flow.

This, however, is not painful as a rule, owing to the fluid condition of the blood and patency of the canal.

**DIAGNOSIS.**—Upon examining these cases of posterior displacement, the uterus is found low in the pelvis. If there be pronounced retroversion, the finger first touches the posterior lip of the cervix, and the uterine tissue continues from this point backward and downward. There is absence of the body from its normal position, and rectal touch demonstrates its presence in the cul-de-sac in retroflexion; in retroversion the body presses on the rectum higher up. In aggravated

FIG. 159.



Bimanual Reposition of the Retroflexed Uterus: second step.

cases the ovaries also lie so low as to be felt easily to either side of the uterus. The fundus is tender, and more or less enlarged according as the displacement occurs post-partum or not.

The local tenderness and size, with many of the subjective symptoms, vary greatly according to the causative factors.

Retropositions of the post-partum uterus, or the organ materially softened by endometritis and metritis, have commonly both versions and flexions associated. Therefore one author will describe a certain case as retroflexion, while another places it as retroversion. If

the uterus be flexed to any extent, there will be a convexity on the anterior surface of the organ where normally there should be a concavity, and the reverse on the posterior border. The finger in the rectum, with abdominal palpation, makes the diagnosis absolute, for every portion of the organ can thus be reached. In all cases, when necessary, the sound will demonstrate the direction of the uterine canal. It is a matter of importance to determine whether or not the uterus can be replaced or whether it is adherent to the rectum. Before doing this one should know that there is no suppurative focus in the tubes or ovaries.

FIG. 160.



Bimanual Reposition of the Retroflexed Uterus; elevation of the fundus by the internal hand.

**TREATMENT.**—Two objects are aimed at—the return of the displaced uterus to its natural position and the cure of any coexisting disease of this organ or its adnexa. One of four methods of replacement may be adopted: replacement by the hands alone, by the knee-chest position, by the sound, or by the repositor.

In thin women only can the uterus be replaced with ease by the unaided hands. In fat women it is often rather difficult, and is then best accomplished by means of the finger in the rectum, or by the knee-chest position. These two methods have great advantage over all others in that they are applicable to cases with septic endo-

metritis, for they do not necessitate invasion of the inside of the uterus. They should be tried faithfully and persistently before resorting to other means. These two methods of replacement are the only ones which give good results. Rare indeed must be the cases in which they fail when properly tried.

*Bimanual Reposition.*—The patient assumes the half-reclining posture, with the knees flexed on the abdomen and the clothes perfectly loose. The finger is introduced into the vagina and passed behind the cervix. The tip is gently bent and attempts are made

FIG. 161.



Bimanual Reposition of the Retroflexed Uterus; the external hand taking charge of the fundus.

to pull the cervix forward toward the symphysis pubis so as to dislodge the fundus from the hollow of the sacrum. The free hand on the abdomen is crowded down hard, following the curve of the sacrum. The object is to keep as far back in the pelvis with this hand as possible, and to pin the retroposed uterus against the symphysis. No attempt has so far been made at reduction—merely the preliminary step of fixing the organ. The vaginal finger is now carried behind the body, which is lifted as high as possible along the curve of the hand pushed into the abdomen, until it is well



in front of the fingers of the free hand. This is then moved slowly forward toward the pubis until resistance is met with. This manœuvre bends the body of the uterus upon the cervix.

FIG. 162.

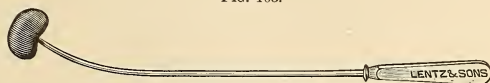


Bimanual Reposition of the Retroflexed Uterus, completed.

The vaginal finger is then placed in front of the anterior lip of the cervix, and this is pushed upward and backward to the promontory of the sacrum, while at the same time the body is held anteriorly. The last movement is to push the cervix suddenly upward in a straight line toward the pelvic brim by the finger beneath the os tincae. The uterus is now in an anteverted position. If the cervix is held high in this position while the patient gets up and stands, the intestines will fall behind the uterus and the intra-abdominal pressure keep it in place, or if it is intended to fit a supporting pessary, this should now be done while the cervix is held upward and backward.

*Knee-chest Reposition.*—The patient is placed in the knee-chest position and the perineum is lifted up with a Sims speculum. This

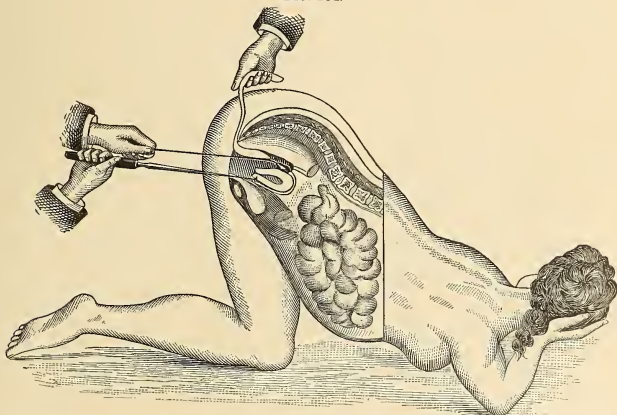
FIG. 163.



Uterine Repositor.

at once allows the intestines to fall away from the pelvis into the abdominal cavity. The cervix, thus exposed, is caught up with a tenaculum and drawn well forward toward the vulvar orifice. By this movement the fundus is drawn forward sufficiently for it to swing past the promontory of the sacrum, by the aid of gravity,

FIG. 164.



Replacement of Retrodisplaced Uterus by means of the Uterine Repositor, with the patient in the knee-chest position.

which it will do in a small proportion of cases. Should it not do so, as the cervix is drawn forward, the fundus is lightly pressed upon by means of the repositor shown in the cut, and thus forced into place. A firm cotton tampon is then placed anterior to the cervix, and the patient allowed to assume a recumbent position; as she does so the intestines fall back into their normal position, and with the intra-abdominal pressure aid very materially in keeping the uterus forward.

The uterus may be replaced in women who are stout, and in others who are unable to relax the abdominal muscles, by putting them in the knee-chest or dorsal position, and employing combined rectal and abdominal reposition. The manipulation is very similar to that of the bimanual method just described.

*Replacement with the sound* is accomplished by curving the instrument so that it may be introduced, and then causing the instrument to make a half sweep. The whole weight of the organ falls on the point of the sound, which lacerates the endometrium, and has in innumerable cases perforated the uterus. In this manœuvre the organ is not raised as a whole, but the fundus is merely forced into a different relationship to the cervix. If there be any adhesion or other restraint to the raising of the organ, the risk of perforation becomes very great, for there is no escape from whatever force may be used.

The better method in all cases where manipulations fail—and only when they do fail after repeated trials—is as follows: The patient being on the back or in Sims' position the bladder and bowels empty, the *repositor* is introduced very gently into the vagina and locked; the point is made to enter the cervix and engage there, when the instrument is unlocked. This makes a sound with a joint. The stem portion should be only long enough to reach the internal os. Then by gentle and careful manipulation the intra-uterine portion is coaxed to enter the canal until it has just passed the internal os. The proper length has been selected previously and fitted to the hinge. The finger of one hand is then pushed high up against the back of the fundus, and attempts to lift it are made by turning the screw in the handle of the instrument. If there be no adhesions, the uterus will become anteverted, and, more, it will be made, cervix and body, to assume the normal position in the pelvis; and this is an important property not attaching to the use of the sound. The instru-

FIG. 165.



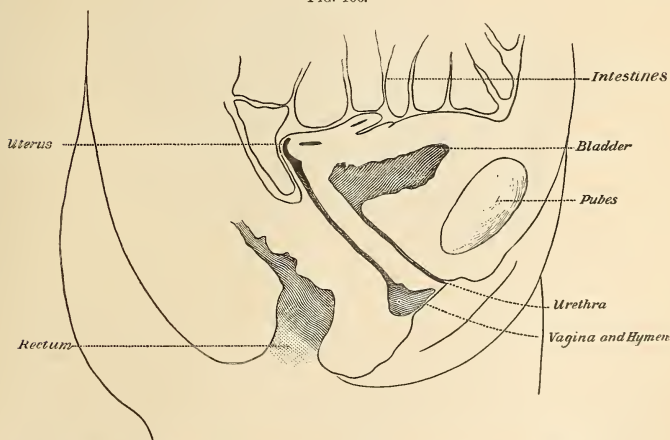
Sims-Pryor Uterine Repositor.

ment is removed, still unlocked, by supporting the cervix with one finger against it and using the symphysis as a fulcrum to slip the staff out of the uterus. If there be intimate adhesions between the

fundus and rectum, the efforts to replace the organ will merely drag up the bowel for a short distance, and with the finger in the rectum, the anterior rectal wall will be felt to leave the finger while such effort is being made. Or, should the adhesions be of some length, the organ will be replaced to a certain extent only, and then checked by the false bands. We are perfectly aware that there is risk attached to this manœuvre, but with our present method of cleansing the operator, vagina, and instrument this is reduced to a minimum. We do not consider that any more danger attaches to its use than to that of the sound.

If it be desired to support the uterus by tampons after replacing it and removing the repositor, the patient should be in Sims' posture. It will then be much easier to replace the organ, as the introduction of the speculum allows the intestines to gravitate away from the uterus. A glance at Waldeyer's plate demonstrates the manner in which this reposition takes place. Were the uterus retroverted and the bladder entirely empty, elevating it in the axis

FIG. 166.

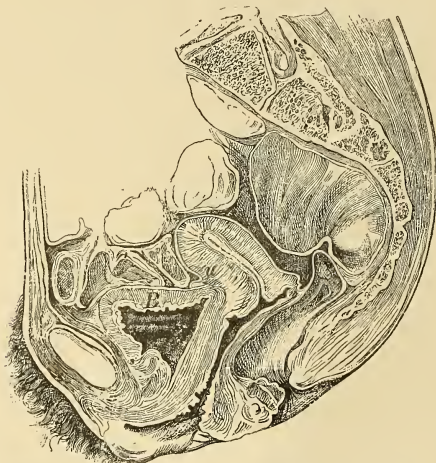


Girl Aged Thirteen, Frozen Section, showing direction of intra-abdominal pressure; relations of uterus before puberty; and great strength of pubic segment of pelvic floor.

of the vagina to a point near the sacral promontory would inevitably result in the fundus being dragged forward by the bladder and associated tissues.

This could all be accomplished with the finger against the cervix were the finger long enough. The stem is merely for the purpose of affording a hold on the cervix. By observing even the ordinary rules governing all intra-uterine manipulations there is not much danger attending the use of this instrument. It elevates and replaces the uterus merely by following back the path in which the displacement came. It takes advantage of the anatomy, and does not act against it. The weight of the organ is borne on the whole length of the stem in the cervix, and not on one point, as in

FIG. 167.

Waldeyer's Frozen Section of the Female Pelvis; *u*, uterus; *B*, bladder.

the use of the sound. With it the exact degree of mobility may be appreciated. But it is *not* to be used where there are pathological conditions in the adnexa, or septic endometritis, and therefore must have a very limited application. Its use as a means of diagnosis of pelvic neoplasms cannot too strongly be condemned. It should be employed only in those cases of free retroposition where there is no septic focus in the uterus, peritoneum, tubes, or ovaries. This cannot too strongly be insisted upon.

Again, we repeat, this method is to be used only when manipulation fails or is impossible, but is always to be preferred to the

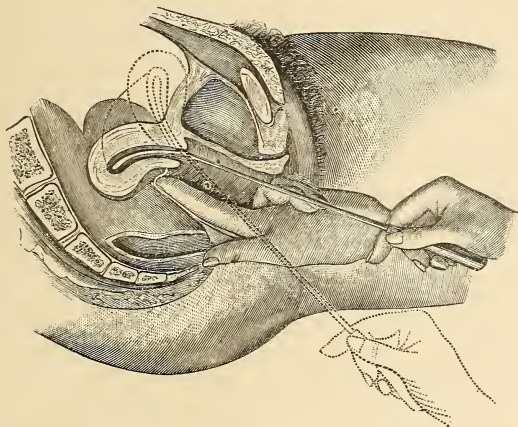


reposition by the sound. Both are to be considered only as last resorts.

As a matter of fact, no attempt should ever be made to forcibly replace or otherwise interfere with a uterus which is bound in its displaced position by adhesions. It is impossible to determine accurately whether or not there is disease in the uterine appendages in many cases, and irretrievable damage may unwittingly be done in the manipulations. The only safe and intelligent operations for these conditions are intra-abdominal.

Comparatively few retro-displacements exist without some complicating inflammatory trouble, either intra-uterine or intra-abdom-

FIG. 168.



Diagnosis and Reduction of Retroflexion by the Sound.

inal, and the symptoms usually arise from the complications and not from the displacement. It is all the more necessary, therefore, to be on one's guard in selecting proper cases for this treatment.

A uterus may be caught between rigid utero-sacral ligaments, and be so tender as to convey the impression that it is adherent. The question of mobility or fixity in a doubtful case can always be definitely settled under narcosis. No apparently fixed uterus should be treated as such until attempts at replacement have been made while the woman is unconscious.

The object of all treatment must be to have the uterus approach



the normal in size and character of its walls, and to place the supporting agents in a healthy condition. Therefore, if the uterus be retroposed and enlarged, it is essential that it be supported in the proper position while such means are employed as will reduce its size. After the uterus has been replaced in such cases it is kept in position by placing in the cul-de-sac a cotton tampon soaked in some depleting agent, as boro-glyceride or ichthyol-glycerin, and then introducing a tampon of lamb's wool. This latter should be put in lengthwise, rolled hard, and turned sideways, so that the ends will rest against the inferior pubic rami and the tampon be in front of the cervix. When the patient stands the downward motion of the cervix is retarded, and intra-abdominal pressure forces the corpus on the bladder. Combined with this, intra-uterine injections of tincture of iodine are to be used in cases not infected and where the uterus is enlarged. The uterus being elevated, its circulation is improved; being in proper position, drainage is secured; and the astringent intra-uterine and depleting hot-water vaginal injections tend to a reduction in size. It is well to remember that a large percentage of cases of retroposition give rise to no symptoms whatever, and are discovered only upon the supervention of some complication.

When endometritis or pelvic inflammation complicates the displacement, it is to be treated as set forth in its respective chapter. All such complications must be most carefully attended to if successful results are expected. Of those cases of retro-displacement giving rise to serious symptoms the larger proportion are caused by these complications, and not by the displacement *per se*.

Having placed the organ in the proper position and condition, if there be tears in the pelvic floor they must be repaired. Nothing tends to the production of the displacement more than costiveness and straining at stool while the woman is still puerperal. Therefore in all cases where the perineum is torn it is better to give a softening enema each day, rather than allow her to strain at stool and occasion a rectocele. Certain cases of retroposition are symptomatically relieved upon the establishment of thorough drainage, and commonly the attendant endometritis is cured.

Artificial supports, as pessaries, are contraindicated until the uterus returns to a healthy condition and all lacerations conducing to displacement are repaired. When that is done, we will find

in most cases that pessaries are not needed. The tampon acts so much better in the majority of cases where any such support is called for that the pessary is falling more and more into disuse. The tampon has none of the dangers attendant upon the use of the pessary, and is even more effective.

Retroversion without enlargement, such as we find in the unmarried, is exceedingly difficult to treat. Here one of three things must be done: either fit a pessary, or perform Alexander's operation, or hysterorrhaphy.

If it is decided to *fit a pessary*, this should be done only after the uterus is replaced. It is presumed that the integrity of the pelvic floor has been made or is perfect. Therefore the apparent vaginal space while patients are on the back is not the actual when they are standing. So it is that a pessary which seems to be loose while the patient lies down becomes too tight as soon as she assumes the upright position, because of the contraction of the pelvic muscles to support the organs against the intra-abdominal pressure. While the pessary is in situ, the finger should pass all around it with ease. Pessaries act, not by supporting the corpus, but by pushing the cervix up away from the symphysis and pelvic floor, thereby enabling the bladder and the weight of the intestines to drag forward and retain the corpus. It would be unfortunate could a pessary be applied so that it extended up into the cul-de-sac higher than the internal os: ulceration of the vagina would be inevitable. Fortunately, unless the pessary be excessively long, this is impossible of accomplishment.

The soft-rubber ring, or the Smith-Hodge pessary of hard rubber, is preferable to all others. The Smith-Hodge pessary may be softened and bent into any shape by immersion in boiling water.

If the pessary produces the least pain, it should be removed by the patient at once. And it is positively contraindicated where there is any disease of the adnexa, septic endometritis, urethritis, vaginitis, lacerated perineum, cystitis, adhesions, and whenever the uterus bends back over the instrument. Not often, then, can pessaries be employed with advantage. They are of most service in cases of displacement following labor or from any other acute cause.

Pessaries should be introduced as follows:

The patient is placed on the back and the uterus replaced. It

is essential that the bladder and bowel be empty. The labia are separated by the fingers of the left hand. The index finger of the

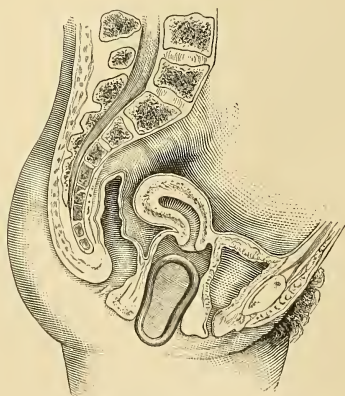
FIG. 169.



Introduction of Pessary, first stage.

right hand holds the well-greased pessary, the thumb and middle finger steadying it. The broad end of the pessary is introduced

FIG. 170.

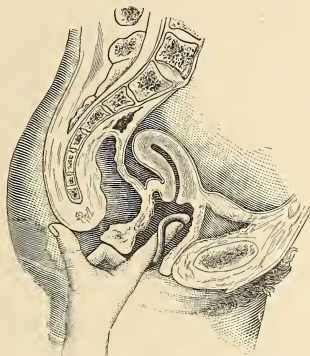


Introduction of Pessary, second stage.

with one side under the pubes and obliquely, so as not to press upon the urethra. As the advancing bar of the pessary passes the vulva

the hand holding it is carried high in front of the pubes, so that the pessary may be inserted in the curve of the pelvic outlet. As the

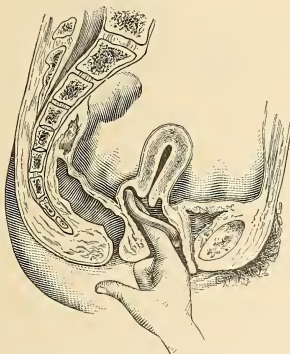
FIG. 171.



Introduction of Pessary, third stage.

pessary advances it is rotated until it lies on its flat side on the floor of the vagina. When it has entered the vagina so as to reach the

FIG. 172.



Introduction of Pessary, fourth stage.

cervix, the index finger of the right hand is passed into the vagina under the anterior bar of the pessary, until it reaches the posterior

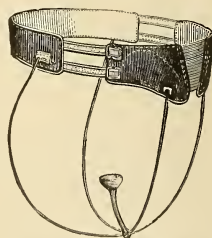
end, over which it is hooked, pressing the bar downward and backward, thus guiding it into place behind the cervix. The point of the pessary should not press upon the neck of the bladder or the urethra, but it should be curved downward, so as to take support from the converging pubic rami, thus leaving a space between the arms of the point for the urethra. Again, the base should not be so curved as to press against the ischial rami below. A fairly good test is to pass the finger all around the pessary while the woman is on her back. If that may be done, when she stands and the muscles of the floor of the pelvis contract, the pessary will be snug enough.

Pessaries should not cause the least pain, and patients should not know that they are wearing them except by the relief of disagreeable symptoms. Those pessaries having rings into which the cervix fits are objectionable, in that the cervix settles down into the ring so snugly as to obstruct the egress to its secretions.

Stem pessaries with a bow attachment are dangerous affairs, even more so than stems alone.

Pessaries which fasten to belts outside the body are not to be used, except in cases of complete prolapse where the patient refuses all surgical treatment. Under these circumstances they are often of great value.

FIG. 173.



Pessary for Complete Prolapse.

Even in cases temporarily benefited by the use of pessaries the questions must arise: How long can the patient wear one? Do they ever cure, and are they not merely unsatisfactory makeshifts? In cases in which they appear of use, are there not better methods? It is far better for the patient to go twice a week to the physician for the introduction of a supporting tampon of sterilized

wool if it can be retained than to wear a pessary, even under observation.

Granted that the uterus has been gotten into a normal condition and all lacerations of the pelvic floor are properly repaired, it is occasionally necessary to use pessaries.

Patients who use pessaries should take daily cleansing douches, and have the supporter removed once a month, cleansed, and allowed to remain out for twenty-four hours before being replaced.

*Surgical treatment* of retro-displacements has for its object the replacement of the womb in its proper position and the cure of the complicating disorders. It is divided into two classes: those operations performed through the vagina, and those through an abdominal incision.

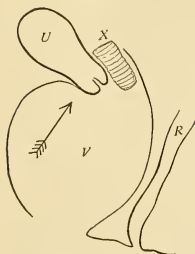
Experience has taught that with one possible exception—posterior vaginal section as proposed by Pryor—the results of all the vaginal operations for the purpose of replacing the uterus which necessitate an incision of the vaginal vault, either anterior or posterior, are fraught with so much future danger to a woman in the childbearing period that they need only be mentioned to be condemned.

*Posterior Vaginal Section.*—The patient is placed in the lithotomy posture. The uterus is curetted and irrigated, but not packed. Pulling the cervix down, the operator cannot readily determine the point of reflection of the vagina from the cervix; but upon pushing up the cervix he will see a prominent crescentic fold form just behind the cervix. This is incised with blunt scissors for a distance of about one inch. The cut extends through the vaginal mucous membrane only, and at the sides stops short of the middle line. But one layer now remains to be severed—viz. the peritoneum. The anatomical fact must be borne in mind that sometimes the peritoneum is reflected from the rectum to the uterus at a point opposite the internal os, and in other cases it dips deep down behind the posterior vaginal wall. Therefore it is safer to not at once cut through the tissues lying beneath the vaginal incision, but to insert one finger and shove it up to the level of the internal os, while down-traction upon the uterus is maintained. If the finger has not penetrated to the pelvic cavity by this manœuvre, the pocket formed by the finger is wiped dry and the cavity inspected. The peritoneum will be seen bulging out into the incision at each movement of the diaphragm. Where the peritoneum is attached to the uterus it is seized with mouse-toothed forceps and carefully divided with scis-



sors. Inserting one finger into the opening, the operator makes a thorough digital examination of the pelvic contents. Slight adhesions are readily broken up. If dense or extensive adhesions exist, the case is more properly one for hysterorrhaphy. If satisfied that all adhesions have been severed and that the adnexa are free from disease, the operator wipes the pelvic cavity dry. The nurse has prepared a roll of iodoform gauze to which is attached a stout silk cord, and this the operator places just within the cut edges of the peritoneum. This roll of gauze should fit the incision snugly, and should not be so long as to project up above the level of the internal os, or project so far into the vagina as to be shoved up into the pelvis by the patient's movements. The uterus is now packed with iodoform gauze. Having properly placed this roll of gauze, the cervix, with the gauze still in place, is shoved upward and backward in the axis of the vagina until the vaginal walls are straightened out and the corpus uteri is manipulated into anteversion. While holding the cervix high up by means of the long retractor the operator places wads of gauze in front of and to each side of the cervix,

FIG 174.



U, uterus; V, vagina; R, rectum; X, wad of gauze. The cul-de-sac has been opened, the uterus replaced, and the wad of gauze placed in the incision. The vagina is distended with gauze, which is not shown, but the direction of effort of the vaginal gauze is indicated by the arrow.

so as to maintain the cervix in a backward and upward position (Fig. 174). This will necessitate packing the vagina very snugly, sufficiently so as to encroach upon the bladder-space in front and rectal space behind. A good deal of dexterity is required to properly place the roll of gauze, to replace the uterus, and to maintain it in an anteverted position by means of the vaginal packing. A permanent catheter is inserted into the bladder and the sphincter ani dilated. In forty-eight hours enough vaginal packing is taken out to enable the operator to remove the uterine packing. This latter is not replaced, but the vagina is again packed as nearly as possible as at first. The self-retaining catheter is removed after washing out the bladder with boric-acid solution. In seven

to ten days the patient is placed in Sims' position and given chloroform. All the vaginal gauze and the gauze roll in the cul-de-sac are removed. Another loose plug of gauze is inserted into the cul-de-sac opening and the vagina again tamponed with gauze. The

second dressing will not require narcosis, and is made six days after the first. Thereafter the dressings are made as soon as they appear wet with the broken-down lymph and serum from the peritoneal surfaces. Throughout the entire treatment the cervix uteri must be kept in its position either by a full vaginal packing of gauze or by placing in front of the cervix a roll of gauze placed transversely, its ends resting against the lateral vaginal walls. The patient is usually allowed out of bed after the second dressing or in about two weeks. Little or no pain is produced by the operation, and hence no morphia is indicated. The object of this operation is to produce a mass of adhesions between the cervix, meso-rectum and utero-sacral ligaments. This anchors the cervix high and back, allowing of the freest movement of the corpus uteri. So long as this scar-tissue remains the uterus will be maintained in an anteverted position through the intra-abdominal pressure acting upon the body of the uterus. And, inasmuch as the new union between the cervix and utero-sacral ligaments is underneath the promontory of the sacrum, there is little tendency for it to break away; for the cervix is protected against the direct influence of the abdominal pressure.

In the course of time the mass of lymph which forms behind the cervix becomes organized into suspending bands. During this lymph-formation there is neither temperature nor infection.

It may be said of this operation that it supposes cutting but two anatomical layers—vaginal mucosa and peritoneum. There are no vessels to ligate, and no sutures to apply.

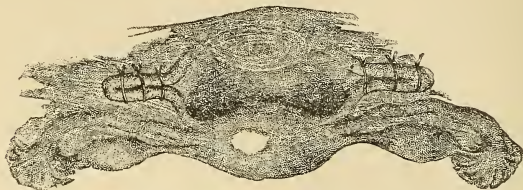
All cases of fixed retroposition in which there is pus-formation in tube, ovary, or broad ligament distinctly contraindicate this operation.

Of the operations through abdominal incisions for the correction of retro-displaced uteri but two have stood the test of experience—Alexander's operation and hysterorrhaphy. The operations devised by Wylie, Baer, and Dudley, having for their object the intra-abdominal shortening of the round ligaments, give promise of future usefulness.

*Wylie or Baer's Operation.*—The abdomen being opened, the inner side of the round ligaments are scraped, so as to make their surfaces raw; then, around a fold of each, three silk ligatures are passed, so as to include most of the ligament and fold the raw peri-

toneal surfaces on each other. The ligaments are thus shortened, the folds being external.

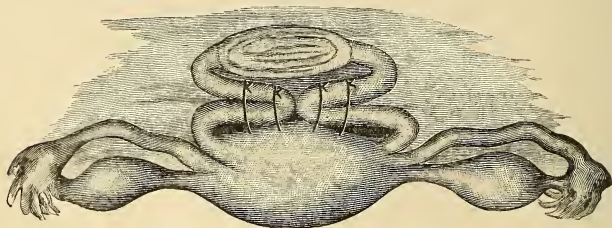
FIG. 175.



Operation proposed by Wylie and Baer for Retro-displacement of the Uterus.

*Dudley's Operation.*—The round ligaments in this case are brought in front of the uterus and attached to its surface by silk

FIG. 176.



Operation proposed by Dudley for Uterine Retro-displacement.

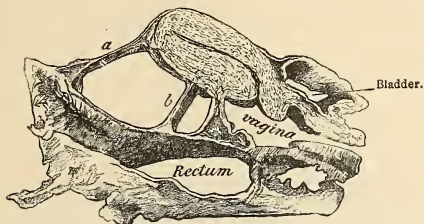
sutures after the approximated peritoneal surfaces have been denuded.

Alexander's operation is an exceedingly rational one, and practically accomplishes the result most effectually where the case is proper for its application. It may be properly applied in those cases of retro-displacement which are not complicated by adhesions or disease of the adnexa. This being so, the operation has but a small field of usefulness. Should adhesions exist, they would destroy the results of the operation, and by this procedure no way of breaking them up exists. Nor is there any method by which the adnexa may be examined and appropriately treated should they prove to be diseased. Diagnostic skill has as yet not reached such a point that either of these conditions can be determined with certainty in all cases without the abdomen being opened. Therefore,

cases to which Alexander's operation could properly be applied must often be submitted to an hysterorrhaphy, on account of the uncertainty of the local conditions in the pelvis.

It is an undisputable fact that the vast majority of retro-displaced uteri which give rise to annoying or serious symptoms are com-

FIG. 177.



Retroversion of Slight Degree: adhesions (*a* and *b*) passing from the fundus and posterior wall to the rectum.

plicated by inflammatory disease of either the uterus itself or its adnexa, or the results of such inflammations, and that the symptoms arise, not from the displacement, but from the complication. Therefore most retro-displacements must be looked upon not in the light of the displacement, which in the vast majority of cases would in itself give rise to no symptoms, but in the light of the complications. We therefore treat the complications, not the displacement—otherwise we may expect little or no results. For the best accomplishment of this, as far as intrapelvic complications are concerned, hysterorrhaphy is the only operation worth considering. In this procedure the abdomen is opened, and the pelvis and all its contents carefully examined and intelligently studied. Any lesion which exists is with certainty detected and properly treated. It is often found after this that hysterorrhaphy need not be performed.

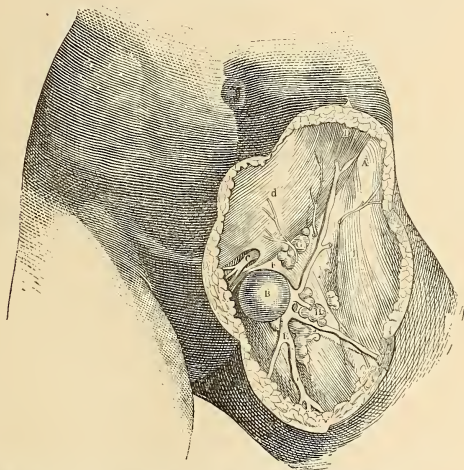
*Alexander's Operation.*—The indications for this operation—shortening the round ligaments—are limited. Granted that the perineum has been repaired and all apparent lesions of labor corrected, yet the organ persists in a retroposed state, in spite of well-directed efforts with replacement, pessaries, and tampons to keep it forward. There are no adhesions, and no tubal or ovarian disease or intrapelvic adhesions involving the uterus. In other words, all the pelvic organs seem to be in a healthy condition, but the uterus maintains a retroposition, which still gives rise to symp-





point is over the site of the internal ring. Cutting upon the director exactly in the direction of the fibres of the external oblique aponeurosis, one sweep of the knife lays open the anterior wall of the inguinal canal along its whole length. All hemorrhage is now absolutely controlled. An assistant exposes the contents of the canal by drawing apart the lips of the incision with the aid of tenacula. The lower fibres of the internal oblique muscle are seen crossing the upper half of the canal. In a fair proportion of cases the lower

FIG. 179.



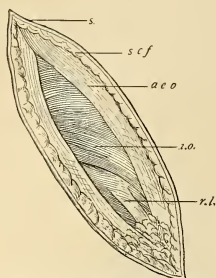
The Round Ligament and its Topographical Anatomy: G, glands in the neighborhood of Poupart's ligament; H, glands in the neighborhood of the saphenous opening; I, sartorius muscle seen through its fascia; d, aponeurosis of the external oblique muscle; C, external portion of the round ligament. The other letters refer to the same parts as seen in the preceding figure.

end of the round ligament is at once exposed to view, emerging from beneath the lower border of the internal oblique; more generally it is well covered and entirely hidden from view by this muscle and an investment of fatty tissue. If the ligament is not at once exposed to view and recognized, it is to be searched for in the following manner: Retract the internal oblique muscle upward and inward by a blunt hook. Take two small blunt hooks, one in either hand, and sweep one of them, point downward and outward, along the posterior and outer walls of the canal from the depths of the wound skinward, hooking the entire contents of the canal. By teasing



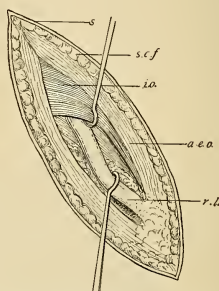
these contents apart, more or less, by means of the two blunt hooks, the round ligament, surrounded by fat and muscular and tendinous

FIG. 180.



Incision, 5 cm. long, through aponeurosis of external oblique, laying open inguinal canal from external to internal ring, and exposing internal oblique muscle and round ligament. The ligament is more or less concealed according to greater or less development of internal oblique: *s*, skin; *s.c.f.*, subcutaneous fat; *a.e.o.*, aponeurosis of external oblique; *i.o.*, internal oblique; *r.l.*, round ligament.

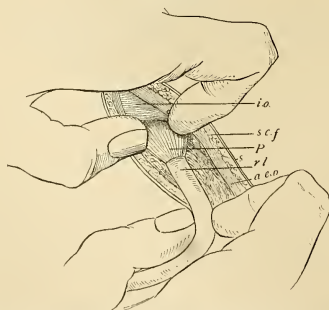
FIG. 181.



Isolating round ligament from its attachments in inguinal canal: *s*, skin; *s.c.f.*, subcutaneous fat; *i.o.*, internal oblique; *a.e.o.*, aponeurosis of external oblique; *r.l.*, round ligament.

fibres from the internal oblique and accompanied by the ileo-inguinal nerve, will soon be recognized, and can be followed to the internal ring. The ligament is separated from its investments in the

FIG. 182.

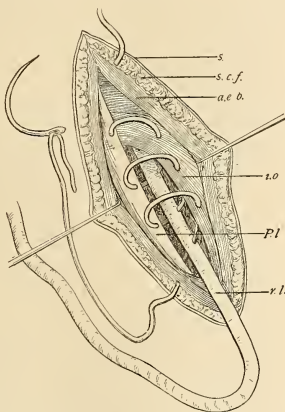


Drawing round ligament out of abdomen and stripping back, investing peritoneum of broad ligament: *i.o.*, internal oblique; *s.c.f.*, subcutaneous fat; *p*, peritoneum; *r.l.*, round ligament; *a.e.o.*, aponeurosis of external oblique; *s*, skin.

canal, care being taken not to injure the ileo-inguinal nerve. The ligament is now drawn out at the internal ring. As the ligament

gradually emerges at the internal ring the investing peritoneum comes with it. This is stripped back into the abdomen as the ligament emerges farther and farther, until finally a finger in the depths of the wound will feel the cornua of the uterus. The opposite round ligament is sought, and drawn out in the same way. After securing the desired position of the uterus by traction upon the ligaments, and adjusting the latter nicely along the bottom of the canal, the wounds are closed by sutures. The parts are brought together much after the principle of Bassini's operation for hernia.

FIG. 183.

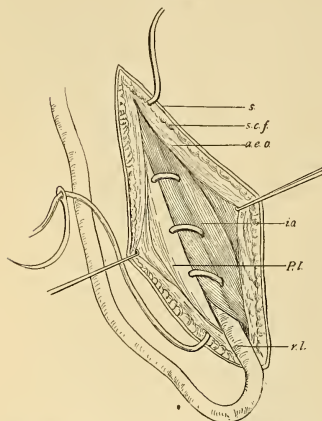


Deep tier of buried running suture of forty-day catgut, embracing internal oblique and transversalis muscles, round ligament, and Poupart's ligament. Deep part of uppermost loop of suture (not showing in cut) passes at level of and embraces margins of internal ring: *s.*, skin; *s. c. f.*, subcutaneous fat; *a. e. o.*, aponeurosis of external oblique; *r. l.*, round ligament; *P. l.*, Poupart's ligament.

Beginning at the upper angle and inner side of the right wound, the first sweep of a medium-sized curved needle armed with silk pierces the aponeurosis of the external oblique, the underlying internal oblique and transversalis muscles, the margins of the internal ring, the round ligament as it emerges between them, and the projecting shelf of Poupart's ligament. The succeeding loops of the deep tier of sutures, three or four in number, pierce the internal oblique and transversalis muscles, the round ligament, and Poupart's ligament. The last loop, in addition, penetrates the outer pillar of the external ring, and emerges upon the outer surface of the external oblique aponeurosis at the lower end and outer side of

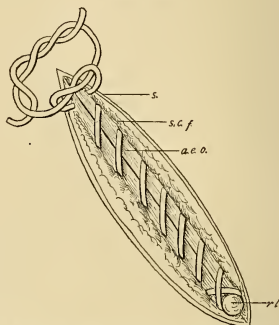
the fascial wound. A stitch is then taken with still the same strand of silk, piercing the internal pillar of the external ring, round liga-

FIG. 184.



Deep tier of suture drawn home, obliterating inguinal canal: *s.*, skin; *s.c.f.*, subcutaneous fat; *a.e.o.*, aponeurosis of external oblique; *i.a.*, internal oblique; *P.L.*, Poupart's ligament.

FIG. 185.



Superficial tier of buried suture of forty-day catgut closing incision through aponeurosis of external oblique, restoring anterior wall of canal. The excess of round ligament has been cut away just outside of external ring. The part protruding through ring, together with pillars of external ring, pierced by lowest loop of superficial suture. Loose knot at upper end shows proper way of tying buried catgut knot to prevent slipping. Skin and fat to be closed, all by a subcutaneous catgut suture: *s.*, skin; *s.c.f.*, subcutaneous fat; *a.e.o.*, aponeurosis of external oblique; *r.L.*, round ligament.

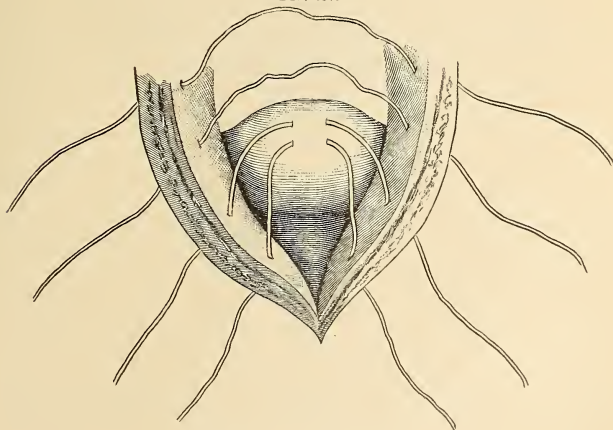
ment, and external pillar. The excess of round ligament is now cut away just outside of the external ring, leaving the stump to plug the ring. After thus obliterating the inguinal canal and closing both internal and external rings, the same strand of silk is continued upward as a running suture, uniting the lips of the incision in the external oblique aponeurosis and closing the anterior wall of the canal. The two free ends of the suture at the upper end of the wound are now tied. The skin is approximated over all by a superficial silkworm-gut or silk suture, and the wound closed without drainage. The ordinary dry sterile dressing used for all abdominal wounds is applied (see Technique). No pessary is at any time needed after the operation.

The difficulties of the operation lie principally in the technique, and can all be overcome by practice: this is particularly so in the case of not being able to find the round ligament. Should the ligament break while drawing it out, it should be picked up at its uterine end and the operation proceeded with; in case the end cannot

be readily found, the wounds are best closed and hysterorrhaphy performed. Subsequent hernia is practically the only after-result to be feared.

*Hysterorrhaphy or Ventro-suspension.*—The procedure is essentially a suspension of the uterus from the abdominal wall. Silk-worm-gut is the preferable suture material, combining the advantages of silk and silver wire, while free from their drawbacks. The abdomen is opened as low down as possible, the incision being small. Trendelenberg's posture is of the greatest help, because the moment the abdomen is opened the pelvis can be emptied of bowels, thus eliminating the danger of injury to the intestines. When the abdomen is opened a careful inspection is made of the uterus and adnexa and the exact condition of the pelvic contents determined. Under the combined guidance of eye and touch existing adhesions are severed. In the majority of cases manipulation with two fingers will suffice to break up the adhesions. Old and very firm adhesions may require the assistance of the scissors or scalpel, care being taken that the rectum be not wounded. It is in just these cases, the diffi-

FIG. 186.



Sutures in Position in Hysterorrhaphy.

culties of which may not be foretold, that Trendelenberg's posture is of especial benefit; the incision need not be longer than is required in the horizontal posture. If the operation be attempted in

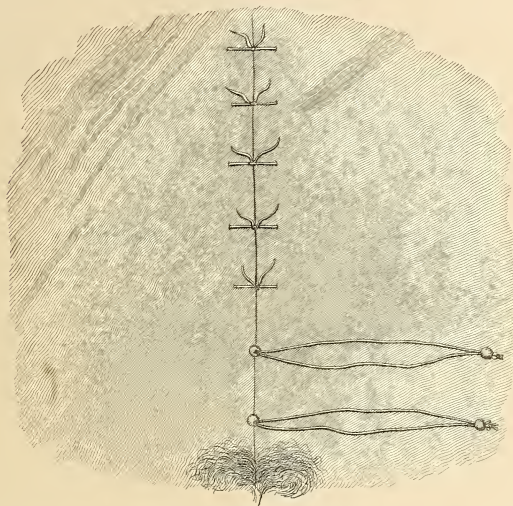
the latter posture, the greatest annoyance is felt from the intestines slipping in between the fingers: intestines are thereby subjected to unnecessary and at times dangerous handling. Hemorrhage due to severing the adhesions is slight, as a rule. Should the capillary oozing be at all disagreeable and collect in a pool in the cul-de-sac, a wad of antiseptic gauze may be introduced to exercise pressure and catch the blood. This is to be removed just before the sutures are tied. Very seldom will a ligature or stitch be necessary to control the trifling bleeding. Should such be required, it may preferably be of catgut.

The uterus being freed and elevated, the adnexa are carefully inspected, if their exact condition has not already become apparent while releasing the uterus. Should they be the seat of disease, whatever method of treating them is indicated is carried out. The uterus is lifted up into the wound and the exact site for the fixation of the womb is determined. A suture is passed through the entire abdominal wall of one side. The needle is again grasped in the needle-holder and passed superficially beneath the uterine serosa at a point a third of an inch posterior to the apex of the fundus uteri from side to side through a space a quarter of an inch in length. The needle is then passed through the abdominal layers of the other side, opposite the point of first introduction. A second suture is introduced in a similar manner about a quarter of an inch posterior to the first one. A full-curved bayonet-pointed needle is best used, one without a cutting edge. Unless a sharp needle be used the needle-punctures bleed but little. These two sutures are held by catch-forceps, and others introduced as usual to close the rest of the wound. Two sutures only pass through the uterine tissue. The uterine sutures are tied first, after which, if it be thought desirable, the patient may be lowered from Trendelenberg's posture, all danger of including gut between the uterus and parietes having passed when the sutures are tied. While tying the sutures, especially those which pass through the uterus, the peritoneum of the incision should carefully be approximated; and it is wise to leave the uterine sutures long for purposes of identification. It is advisable to scarify gently that part of the uterine surface which is to come next to the parietal peritoneum, in order to ensure sufficient plastic union between the opposed surfaces. Dressings are applied in the usual manner. The sutures should be removed about the eighth day, but those through the uterus may remain three weeks or longer. Just



before the removal of these latter the uterus should be held up by a vaginal tampon, which should be employed for several weeks longer. The objections made to the operation are—its possible rate of mor-

FIG. 187.



Stitches in situ in the Abdominal Wall after Hysterorrhaphy. Two lower sutures—the ones which pass into uterine tissue—are shotted.

talities; the production of a break in the ventral wall, with the possibility of hernia; the formation of a false band around which intestines may become caught; the induced immobility of the organ and its effect upon a future pregnancy. None of these objections are pertinent when the hysterorrhaphy is done in a proper manner, but they become forcible when it is improperly performed. They may be considered separately. There is no rate of mortality inherent in the operation, and it does not complicate other operative procedures performed at the same time. The mortality attending it is that only of "accident," which is inherent in every operation which opens the abdominal cavity. The possibility of ventral hernia is undoubtedly attendant upon every operation in which the peritoneal cavity is opened by incision through the abdomen. This complication occurs in inverse ratio to the care in the technique. The per-



centage is exceedingly small. No case, so far as we know, has been reported where intestinal obstruction has been due to the adhesion between the uterus and ventral wall.

It is essential to the future of the patient that a too firm fixation be not accomplished. The object aimed at should be to throw the fundus of the uterus into an anterior position. A slight suspending cord is all that is necessary to keep it there, the intra-abdominal pressure aiding in this. If the adhesion be a broad and firm one and pregnancy follows, considerable trouble may result. During gestation the posterior wall of the uterus develops alone, to the exclusion of the anterior wall, which remains fixed and undeveloped. At labor dystocias of all kinds have been noted, and Cesarean section has been necessitated in a number of instances, with not a few deaths. If the technique be a proper one, the point of adhesion posterior to the fundal apex, and the resulting band be long and thin, merely sufficient for support, but not for fixation, most if not all the dangers of the operation will be avoided. The union obtained by the method described is very tender, and, like other adhesions produced from serous surfaces, it is very elastic and prone to stretch. This is eminently so in regard to the uterus fixed in this position, for it not only has its own weight to bear, but also that of the entire abdominal contents when the pelvic floor tends to bulge under intra-abdominal pressure. Abortion has occurred in uteri so fixed. Pregnancy which has progressed to full term has been frequently reported.

#### PROLAPSUS.

Descent or prolapse of the uterus may be of any degree, from that of slight displacement, which accompanies a retroversion, to the complete, where the whole organ is below the pelvic outlet. Therefore any explanation of the amount of descent must be descriptive, and the condition cannot be divided into first, second and third degrees.

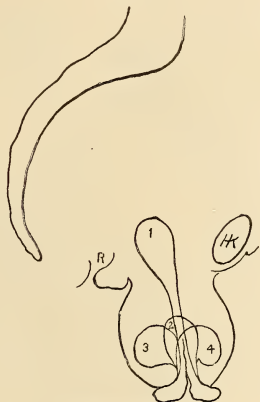
As a very general rule, the condition occurs in women who have borne children, but it also occurs in nulliparæ. In the two classes the affection is essentially different in etiology, pathology, and treatment.

Complete and partial prolapse comes on gradually in most cases, but sudden efforts or effects, as lifting, being crushed, or falling from

a height, may bring it on acutely by rupturing the round, uterosacral, and broad ligaments.

**PATHOLOGY OF COMPLETE PROLAPSE.**—The vagina is inverted. Its posterior wall is prevented from further descent by the sphincter ani. The anterior wall is checked in further descent by its attachment to the bladder, the latter doing this through its insertion at the symphysis. The epithelium of the vagina becomes thick-

FIG. 188.



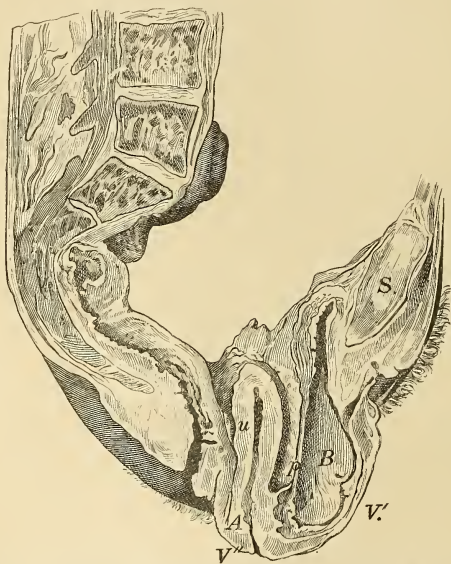
Varieties of Prolapsus.

ened and like cuticle. Continuous irritation against the thighs and clothing may produce local losses of tissue in the shape of irregular ulcers. The urethra is also drawn down and its canal is U-shaped. The uterus occupies the pouch of the inverted vagina, and both before and behind are culs-de-sac lined with peritoneum. Both are below the outlet of the pelvis. Further descent of the uterus is prevented by the anterior and posterior vaginal walls, by the uterosacral ligaments, but still more by the broad ligaments. The round ligaments play but a small part in supporting the organ.

The cervix is engorged from stasis, and its vaginal portion, being the lowest point of the tumor, may be ulcerated. According to the integrity of the external os, there may or may not be ectropion of the cervical mucous membrane. The uterine wall and mucosa are in the condition of chronic hypertrophic metritis and endometritis,

both being thickened with the production of new connective-tissue elements. There is usually chronic urethritis from retention of the urine in the dilated and prolapsed urethra, and there may be chronic cystitis. The cul-de-sac between uterus and bladder and the utero-

FIG. 189.



Vertical Mesial Section of Prolapsus Uteri: *u*, uterus; *B*, bladder; *V*, anterior vaginal wall; *V'*, posterior vaginal wall; *S*, pubic bone; *A*, posterior peritoneal pouch; *p*, anterior peritoneal pouch.

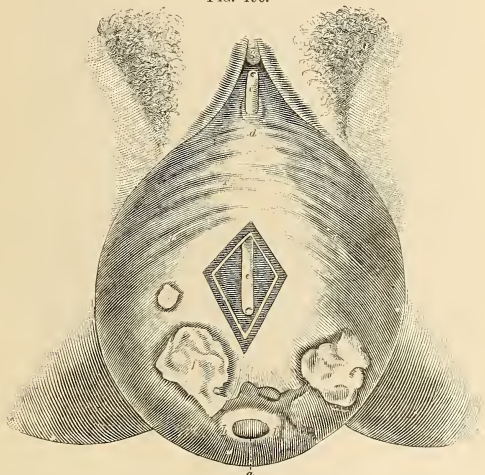
rectal pouch may be occupied by intestines; and the ovaries and tubes lie on top of the fundus. Tension on the broad ligaments produces obstruction in the ureters, and inflammatory conditions, even hydronephrosis, may result. In very old cases marked atrophy of the uterus may ensue.

The condition is essentially that of hernia through the pelvic floor. Continuous irritation of the cervix of the prolapsed uterus existing for years may even produce epithelioma. Torsion of the broad ligaments produces varicocele in the pampiniform plexus. Irritation of the protruding mass has caused acute swelling, with rapid spread of the ulcerations and all the symptoms of strangulation with attendant difficulty of replacement. Anesthesia is then

advisable for reduction, and possibly abdominal section may become necessary. If failure at reduction results, vaginal hysterectomy may be demanded.

CAUSES.—The starting-point of all cases of prolapse is a break in the pelvic floor, or relaxation of the uterine ligaments, or increased weight of the uterus, or all combined. With any one of these factors present an increase in intra-abdominal pressure

FIG. 190.



Complete Prolapse of the Uterus: *a*, cervical canal; *b,b*, superior portion of the vagina, which is now the inferior; *c,c,c*, mucous surface of anterior wall of the vagina; *d*, urinary meatus; *e,e*, probe passed vertically into the former neck of the bladder, to show the total turning inside out of that organ; *f*, ulceration of the vaginal mucous membrane.

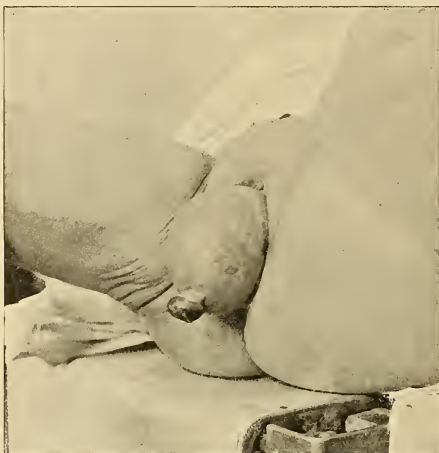
will produce descent of the uterus. Although the ligaments may for a time return the organ to its normal position after such effort, yet the continuous strain will in time produce the permanent lesion.

Thus it is that we find the condition following labor, or resulting from a neoplasm, or associated with subinvolution and supravaginal hypertrophy of the cervix.

Tears in the pelvic floor should warn us against too early resumption of duty after labor. For involution of the uterus alone is not all that is necessary, but the elongated ligaments and generally enlarged parturient canal must also shrink, that the organ may have proper support.

Rupture of the perineum more than any one other lesion conduces to prolapse, and in the following way: The parturient woman is naturally inclined to constipation from the very nature of her weakened condition. In attempting to force out the stool by strain-

FIG. 191.



Complete Prolapsus Uteri, showing ulcer; also hypertrophy of the mucous membrane; the cervix or os not seen.

ing the break in the pelvic floor allows of the escape of a good deal of force, and she has to bear down very hard. As she forces the stool down, it does not have the resistance of the perineum, which would naturally direct it backward through the sphincter. The levator ani, which is the muscle opposed in its action to the sphincter ani, and which dilates the latter, being torn, the sphincter cannot dilate normally, but rather closes more tightly. The stool therefore meets this muscle contracted, and, the pressure still continuing, the contents of the bowel bulge out the rectum into the lumen of the vagina, thereby producing a rectocele. In doing this the posterior vaginal wall is drawn down, and it, in turn, pulls on the cervix. In front of the uterus is the thick-walled bladder, preventing its forward movement: therefore it is pulled backward. This traction, together with the steadily-increasing intra-abdominal pressure which the woman keeps up to force out the feces, produces both retrover-

sion and descent. The bowel being emptied, the pressure subsides, and the elasticity of the tissues draws up the displaced organs.

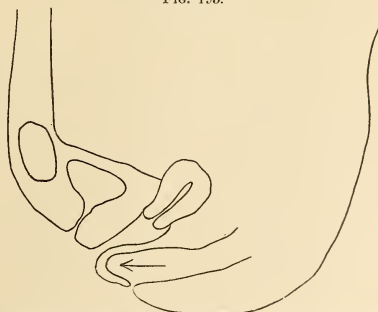
FIG. 192.



The arrow shows the direction of force in the case of a normal perineum when straining at stool. The thick perineum resists, and the fecal matter is consequently forced in the line of the anus and a normal passage secured.

Frequent repetitions of this, together with other acts which increase this intra-abdominal pressure, gradually bring about the condition described as prolapse. The rectocele is the first pouch of tissue to appear, as a rule. Following upon this rectocele, the

FIG. 193.



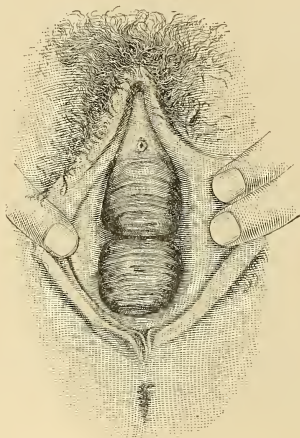
The perineum being ruptured no longer resists the force of straining at stool, but is pushed by the advancing fecal matter until it begins to protrude from the vulval orifice. The result is constipation and progressive formation of a rectocele.

uterus having descended somewhat, comes the anterior vaginal wall, producing a cystocele. In this anterior pouch is contained more or



less of the bladder. Cystocele occasionally occurs before the rectocele, but when it does so it is the result of tears of the anterior wall during delivery. So great has become the desire in forceps and other difficult deliveries to avoid wounding the perineum that the tissues just beneath the symphysis are subjected to much dragging force, resulting in tears to one or the other side of the urethra.

FIG. 194.



Cystocele and Rectocele.

The urethra may even be loosened from its attachments to the symphysis. It is in this way that so great a laxity of attachment of the anterior vaginal wall to the bladder and symphysis is produced as to cause the appearance of cystocele before rectocele ensues. From what has been said the importance of easy evacuation of the bowels by enemata without straining, whenever the perineum is torn, must be apparent. When the axis of the uterus has become coincident with that of the vagina the intra-abdominal pressure bears directly upon the uterus continuously, in a direction which tends to force it out. It must not be forgotten that in its normal position over the bladder, the intra-abdominal pressure is behind the uterus as well as above it, and tends to force it forward. In other words, it supports the organ.

When the cystocele has become at all marked, dysuria is pres-

ent, and considerable effort must be employed to empty the bladder. Thus another cause for increasing the cystocele is generated. Complete evacuation of the bladder becomes impossible; a little urine is retained and decomposes; an irritable and inflamed condition ensues at the neck of the bladder, followed by ardor urinæ. As the cystocele increases in size the neck of the uterus is pulled upon more and more and the descent of the whole organ facilitated. Thus it is that, when once the prolapse is accompanied by cystocele and rectocele, these conditions become causes for such efforts to empty the bowel and bladder as to still further add to the descent.

The mechanism of the pelvic floor is very simple and easily understood. The practical difference in the pelvic floor between the male and female is the additional break in the latter by the vaginal canal. Nature has guarded this very well by surrounding the whole lower third of the vagina with the levator ani muscle and its fascias. In its action this muscle, when contracting, *closes* the vagina, lifts the perineum, and pulls apart the fibres of the sphincter ani if the latter be relaxed. The combined action of both muscles is to close the pelvic outlet entirely. Whenever a nulliparous woman tightens her belly and diaphragm, the pelvic muscles contract involuntarily, as in the

FIG. 195.



Showing effect of intra-abdominal pressure on uterus in ante flexion with intact pelvic floor.

FIG. 196.



Pelvic Floor broken down, Uterus in retro flexion. The intra-abdominal pressure now increases the displacement and ends finally in prolapsus.

various movements of the body. When such a woman defecates, the sphincter relaxes, the levator contracts and closes the vaginal cleft, while the rectal is open, thus preventing any marked descent of the uterus. There is a very sufficient correlation between the actions of the two muscles. There are other supplementary but

unimportant perineal muscles. The levator ani is covered by a sheet of the pelvic fascia, known as the obturator fascia, which gives it great strength.

When the fibres of this fascia and muscle are separated as in laceration of the perineum, their ends retract gradually toward the ischial rami of either side, producing the "angles" or "sulci" spoken of in articles on perineorrhaphy. The older the case the more marked is this retraction. As the rectocele comes down it pushes out between these separated fibres.

A woman with ruptured perineum on defecating relaxes the

FIG. 197.



Illustrating the Formation of a Complete Prolapsus.

sphincter, but the levator fibres are torn asunder, and their dilating action upon the sphincter is gone. She has to strain, and as she does so the vagina can no longer be closed by the levator, but the rent allows the intra-abdominal pressure and the advancing feces to force the posterior vaginal wall out of the vulval orifice, producing a rectocele. In this way, is prolapsus produced. The condition is rightly described as a hernia through the pelvic floor. The result is produced gradually, sometimes taking many years to become fully developed.

The first step in prolapsus is a reposition of the organ. As this increases rectocele supervenes, and in a short time cystocele. When the uterus has descended to the vulva, it loses its retroposed position through its attachment to the bladder, becomes more erect, and is pulled toward the symphysis. On escaping from the body it occupies a position in the centre of the sac. After a certain

amount of descent has taken place retarded venous circulation causes the organ to enlarge, and still more contributes to prolapse.

**SYMPTOMS.**—In acute prolapse there are the symptoms of great shock, signs of internal hemorrhage perhaps, and severe pelvic pain. This condition is rarely seen. Examination will readily demonstrate the lesion.

The uterus is found at or outside the vulva, covered with the anterior or posterior wall of the vagina, according as it was anteverted or retroverted before the accident. The parts are livid from venous stasis, due to pressure on the thin-walled veins in the tense broad ligaments. The patient is usually unable to urinate, owing to distortion of the urethral canal and pressure upon it by the displaced organ. The bearing-down pain amounts to agony.

In chronic prolapse, coming on gradually, the first symptoms are those of backache, bearing-down or tenesmus, shooting pains from rectum to bladder, costiveness, dysuria, pains radiating down the thighs, and absolute inability to walk; and yet a complete prolapse of many years' standing may produce no effect upon the woman, she merely complaining of the inconvenience of the mass. There may be symptoms of kidney disease from obstruction in the ureters, and the peritoneum is often involved in old cases. The erosions which occur produce an annoying discharge. The uterine walls are thickened, but the endometrium is not markedly changed. Menstruation seems as often decreased as increased, due in part, probably, to the fact that most cases occur about or after the menopause. Cystitis is not uncommon, due to incomplete evacuation of the bladder. The costiveness, the continual straining at stool, and the use of evacuants produce a proctitis, which may lead to the supposition of the existence of rectal disease only. Objectively, a tumor is found projecting from the vulva and attached to the margins of the pelvic outlet, and more or less pear-shaped with the base up. At its apex is found the os externum, into which the probe readily enters. As demonstrating the importance of drainage from the uterus, it may be mentioned that these cases, though subjected to much examination at many hands and exposed to all sorts of filth, seldom present the changes of septic endometritis, so perfect is the escape of the discharges.

If intestines be prolapsed into the posterior cul-de-sac, there may be a tympanitic percussion note at the upper border of the tumor behind.

Usually, the tumor may readily be reduced *en masse*, and as readily comes down again. The sound in the urethra follows down the anterior wall of the tumor for a distance. With the sound in the bladder and finger in the rectum the two meet without the interposition of the uterus, and the finger demonstrates that organ in its new position with the broad ligaments as tense lateral suspensory bands. In using the sound in the uterus it must not be forgotten that cases of pregnancy in the prolapsed uterus are not rare. Even ectopic gestation has occurred with complete prolapse. Occasionally the sound will show the uterus to be in a retroflexed position in the sac. The urine has an ammoniacal odor in such cases. In long-standing cases incontinence of urine may come on, the bladder remaining partly filled all the time. Not infrequently the patient is forced to reduce the prolapsed mass and retain it in the vagina by means of her fingers before she is able to empty either the bowels or bladder.

Less descent of the organ than the above description pictures, has been by authors divided into two degrees—the first when the cervix is above the vulval orifice, and the second degree when it appears at or engages in the vulva. They class complete prolapse as of the third degree. There is some convenience in this classification, but it is entirely arbitrary. In examining these cases of lesser prolapse, the patient lying on her back, the uterus recedes quite a distance into the pelvis. But by causing her to bear down, she can readily cause the rectocele and cystocele to appear. Neoplasms and ascites may cause descent if the pelvic floor be not intact.

DIAGNOSIS.—Inversion, polypus, and infra-vaginal elongation of the cervix uteri might be mistaken for prolapse. In inversion there is absence of the cervical canal and presence of the two lateral openings of the tubes at the base of the tumor. The protruding mass is encircled at its highest point by the cervix, presenting the same appearance as though the mass were a polypoid tumor protruding from the cervical canal: in no direction around the protruding mass can the finger be passed into the uterus, but meets with an uninterrupted ring of obstruction. A finger in the rectum will reveal the fundus uteri absent from its normal position and the cup-shaped depression in the intra-pelvic cervix. A polypus hanging from the cervix or protruding through the os presents the cervical opening *above* the tumor. The fundus uteri will be found in its

normal position. At some point about the pedicle the finger can be passed up into the cervical canal, and even into the uterine cavity.

Strangulation of the prolapse may occur when the vulval orifice is small, the organ coming out easily enough, but so swelling from stasis as to endanger its vitality.

The PROGNOSIS is excellent, both as to relief of the symptoms by palliative treatment and as to the result of operative procedures.

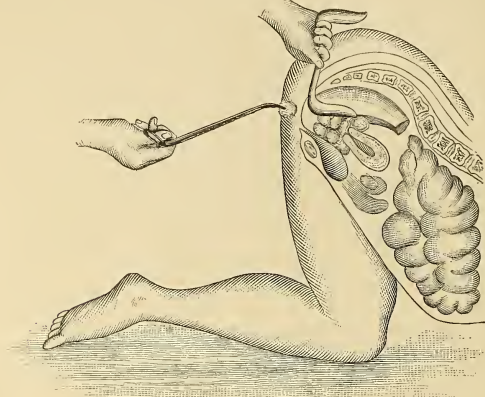
TREATMENT.—It having been ascertained that by taxis the hernia can be reduced, retention in its proper position becomes our object. There are two means by which this may be accomplished. Certain patients will not submit to operation until every other known means has been tried; and in some very feeble and old patients operation is impossible. In employing mechanical supports they should be so used as to produce as little irritation as possible. They must hold up the displaced organs against not only their own weight, but also against the entire intra-abdominal pressure. No support should be used while there are ulcerations. These latter are best treated by applications of iodine, the displacement reduced, the vagina filled with iodoform gauze, and a tight T-bandage applied; or by reducing the displacement, dusting the vagina with boracic acid, and packing it with borated cotton. Having cured the ulcerations and erosions, choice may be made of a means of support. Hard pessaries must take their *points d'appui* from some bony prominence, as the natural curves of the vagina are lost and the canal is perfectly straight, incapable of retaining any pessary against the force of the intra-abdominal pressure. The only pessary which can be of any use in complete chronic prolapse is the cup pessary supported externally by a belt about the waist. This should be removed at night and a boracic-acid vaginal douche taken. Where this cannot be worn a good substitute is Braun's colpeurynter. It takes its point of support *evenly* from all parts of the pelvic outlet. Before introduction it should be thoroughly cleansed, the vagina washed with boracic-acid solution, and the bag covered by zinc ointment. Being of soft rubber, it has a tendency to excoriate the moist parts unless greased. In some patients the bowels and bladder functions continue with the inflated bag in position. The instrument retains the organs in a high position. About an ounce of water should be introduced into the colpeurynter, and the rest of the distention made with air. The



water is merely to fill the tube when the patient is up, and thus prevent the escape of air with collapse of the bag.

The detail of the treatment of the cases of partial prolapse is

FIG. 198.

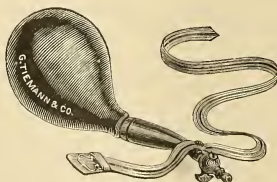


Tamponade of Vagina for Prolapsed Uterus, in the Knee-chest Position.

practically an enumeration of every known pessary and support, the physician trying one after another until one be found to suit the case or all fail.

Patients may experiment with hollow rubber balls until one is

FIG. 199.



Braun's Colpeurynter.

found which will remain in the vagina and keep the uterus within the pelvis. It should be removed each night and cleansed, to be introduced in the morning before rising.

Posture has a marked effect upon the size of the uterus, and

before any operation is done the woman, if possible, should be kept on her back with the head low, the uterus retained within the body, for from ten to fourteen days. During this time also the general functions may be gotten into good condition.

Operative procedures devised and tried are about as numerous as pessaries. The whole question has now narrowed down to a consideration of the best means to unite the levator ani fibres and obturator fascia of the two sides across the vagina at their original points of juncture, thus narrowing the vaginal canal and restoring its proper resisting power, to bring about involution of the usually enlarged uterus, and to hold the uterus upward and forward.

If the descent be due to polypi or other conditions which render the uterus heavy and enlarged, such must be removed by the operative procedure appropriate to each.

A curettage is of value as a derivative, thus contributing to diminution in the size of the organ, whether there be endometritis or not. Amputation of the cervix uteri or Emmet's trachelorrhaphy, as the cervical condition may indicate according to whether it be greatly hypertrophied or lacerated, is a necessary step in the process of repair.

Posteriorly, that operation must be applied which pushes up the rectocele, narrows the posterior wall, and best approximates the separate ends of the levator ani muscle and obturator fascia of the two sides. Operations which drag down or fix the rectocele in situ are to be avoided. Amongst the preferable operations is Emmet's. Upon the anterior wall Sims' anterior colporrhaphy is indicated. These operations should be performed at one sitting. Good results are obtained in all degrees of prolapse by a combination of Hegar's colpo-perineorrhaphy and Sims' operation on the anterior wall.

While in moderate or comparatively recent degrees of prolapse curettage, amputation of the cervix, and repair of the pelvic outlet may so reduce the descent as to symptomatically cure the patients, still in the more pronounced forms of the lesion permanent benefit cannot be expected from those procedures only; they must be supplemented by hysterorrhaphy. In performing hysterorrhaphy under these circumstances an exception is made to the rule laid down when the operation is to be done for retro-displacements. Now the object should be to obtain a broad and firm adhesion of the uterus to the abdominal wall. For this reason the sutures are passed through the

uterus from cornu to cornu, dipping down deeply into the muscular substance of that organ. It is best to place these sutures so that they do not penetrate all the tissues of the abdominal wall, but only the peritoneum, muscles, and deep fascia, the free ends coming out on the surface of the fascia. The ends are securely tied together, and when the abdominal walls are approximated remain buried. The sutures should be of silkworm-gut.

**FREUND'S OPERATION.**—In a certain limited number of cases which have passed the menopause, and in whom genital atrophy has begun, the operator may apply the procedure devised by Freund. But this operation is indicated only when it is deemed unwise to attempt plastic work, and where it is inadvisable to keep the patient in bed for any length of time.

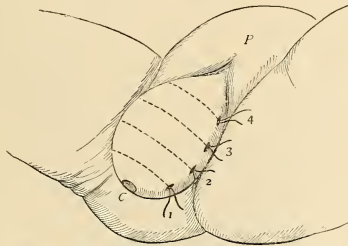
Under narcosis the uterus is curetted and irrigated, but not packed. The uterus is left in a prolapsed position. Upon one side of the vagina about half an inch below (above while the prolapse is present) the cervix the operator makes a short incision through the vaginal mucosa. A stout half-curved needle is threaded with silk to carry silver wire. The needle is introduced into the cut and made to completely encircle the vagina, and is brought out at the point of entry. To it is now attached a strand of silver wire (No. 24), and this is drawn beneath the vaginal mucosa.

Half an inch lower down another incision is made in the vagina and another wire suture drawn beneath the mucous membrane. The procedure is repeated at equal distances until the vulvar orifice is reached. The lowest (highest while the prolapse exists) suture is within the vagina entirely, and is at least half an inch internal to the meatus urinarius. The sutures are half an inch apart, and all lie entirely beneath the mucosa. If possible, the operator should avoid traversing the mucous membrane, but his needle should pass beneath it. It is commonly necessary, because the needle cannot be made to entirely encircle the vagina at one sweep, to withdraw the needle twice for each suture; it should be reintroduced precisely in the aperture of exit. When all the sutures are in place the cervix is replaced sufficiently to tighten the suture nearest the cervix. When the proper degree of tension is secured the wire is closely twisted and the ends cut off outside the fourth turn of the twist. The twisted end is sharply bent and is tucked beneath the edges of the lateral incision. The uterus is further replaced, the second loop of wire is tightened so as to sufficiently pucker the vagina, the ends

twisted, cut short, and tucked beneath the edges of the short lateral cut. In this way, progressively replacing the prolapsed organ and securing the wire loops, the operator completes the operation. The vagina is irrigated with boric-acid solution and a loose filament of iodoform gauze is introduced. This is removed in two days and the vagina again washed out. The patient is allowed out of bed for a few hours after six days.

The success of this operation depends upon the degree of tension produced by each suture. The suture nearest the cervix should draw the vaginal walls together, so that the little finger will pass readily. The next suture will admit of the passage of the index finger, while the suture nearest the vulva constricts the vagina only sufficiently to furnish support to those above. The operation seeks

FIG. 200.



Freund's operation for complete prolapse: *P*, pubis; *c*, cervix; 1, 2, 3, 4, the wire sutures circling the vagina. Both ends are shown protruding from the short lateral incisions in the vagina ready to be tightened and twisted. They are introduced and twisted in the order of their numbers.

the establishment of four permanent submucous silver-wire ring pessaries. The sutures are never removed. They should at least remain in place long enough to cause the formation of rings of connective tissue around the vagina. If the operator has succeeded in applying his sutures tightly enough to afford to each other mutual support, and yet not so tightly as to cause them to cut through, he will have the satisfaction of seeing his patient relieved of this most distressing condition. Coition is to be absolutely forbidden and laborious work avoided. The lateral incisions are preferable to those either upon the anterior or posterior wall, for with the first the wire knots will not lie beneath either movable hollow viscus, the bladder or rectum. The operation consumes about fifteen minutes.

*Acute prolapse* rarely occurs alone, but associated with it are other injuries produced by the same violence. It is to be treated

by gently returning the organ and packing the vagina lightly with cotton or gauze. An ice-bag to the suprapubic region will limit pain and bleeding. Symptoms of internal bleeding from ruptured ligaments should be treated by putting the patient at rest and by saline transfusion.

In old women, who may not expect conception, the preferable procedure is either Freund's operation or extirpation of the organ. The uterus may be removed *per vaginam* much more rapidly and with less risk to these patients than if tedious plastic work be done.

The operation should be performed with ligatures, and the stumps fastened into the vaginal opening, so as to draw the vagina upward during the process of contraction and repair, and give that organ a permanent support from above, which can be obtained in no other way.

The danger to very old women lies largely in prolonged etherization necessary to plastic work of this extent. This is not the case with the rapid hysterectomy.

Not a few failures occur in the hands of every operator to effect a cure in certain cases of complete prolapse. Where this has occurred, or in such cases as, in the opinion of the surgeon (based on experience), it is liable to occur, the operation proposed by Baldy is to be performed. The class of cases to which this method is applicable is limited to women in whom the question of future childbearing is eliminated. Other than the mortality incident to an uncomplicated hysterectomy there is no danger.

**BALDY'S OPERATION.**—A glance at the accompanying diagrams will disclose what is proposed.

The procedure is in all essentials an abdominal hysterectomy by amputation at or below the internal os. The points to be observed are—

To include both the ovarian arteries and the round ligament in the first ligature on each side of the uterus.

To place this ligature as near the pelvic wall as possible, so as to leave but a small amount of broad ligament behind with the stump.

To place but one other ligature on each side of the uterus, this ligature to include the uterine artery with as little other tissue as possible. This leaves both broad ligaments open.

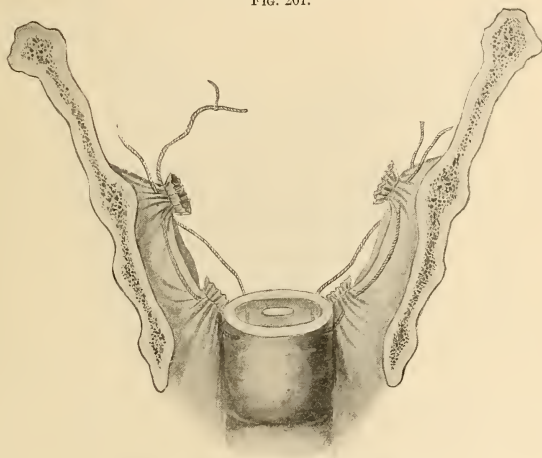
To amputate the uterus as low on the cervix as possible.

Fig. 201 shows this part of the operation completed, together

with the second step—namely, the placing of the sutures. A glance at this illustration shows the suture *in situ*, while a glance at Fig. 202 shows the suture tied with the parts drawn into place.

It will be noted first that the suture is composed of heavy ligature silk—that in the course of its application it includes both the ovarian and uterine stumps, *deeply* placed well *back* of the ligatures. These points are important, as considerable traction occurs when the sutures are tied, and unless these precautions were taken, the suture might tear out or the ligature on the stumps become displaced.

FIG. 201.



Uterus amputated. Ligatures in place ready for tying.

It will be further noted that the sutures include the sides of the cervical stump.

It can readily be seen that the effect of tying these sutures is to lift up the stump of the cervix together with the vagina, and to bring it in close approximation with the ovarian stumps, doubling the opened broad ligaments together, as shown by Fig. 202.

Of course the portion of the broad ligament at the point of the ovarian stump will be drawn down somewhat, but the main effect is to lift to a high point the cervical stump and at the same time to drag up the vagina. Adhesions take place throughout the full extent of the doubled broad ligament, and most surprisingly firm support is given from above to the vagina.



Fig. 203 shows the peritoneum drawn together by a catgut suture over that portion of the cervical stump which remains uncovered after the two sutures are tied. The abdominal incision is closed in the usual manner and the usual dressings applied.

The result of the operation is as near perfect as is possible by any operative procedure.

The results accomplished are—

The weight of the heavy uterus is removed.

FIG. 202.



Ligatures tied; lifting up cervical stump; approximating cervical stump and ovarian stumps.  
Broad ligament doubled upon itself, burying uterine stumps.

The over-stretched vagina is lifted high up and held firmly in place.

The supports utilized are the natural supports of the uterus and upper portion of the vagina—the broad ligaments.

The cervix remains a pelvic organ, as is natural to it.

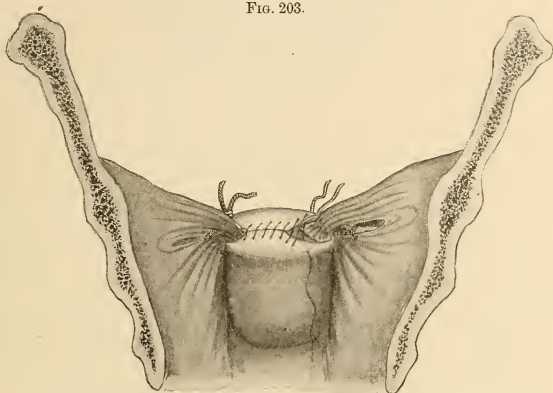
The immediate and remote result as regards fixation of the upper part of the vagina is perfect.

The plastic operations on the vagina already recommended are absolutely essential as an adjunct to this as well as to any other similar procedure, for the reason that unless we remove the causes which produced the original prolapse we can hardly hope to escape a relapse, however well the work above may be conceived and executed.

In cancerous or tubercular disease of the uterus the operation

may be varied by performing a pan-hysterectomy. The vaginal mucous membrane is to be whipped together, closing off the vagina. The cut edges of the broad ligaments should be whipped together on both sides down to the former site of the cervix. The raw sur-

FIG. 203.



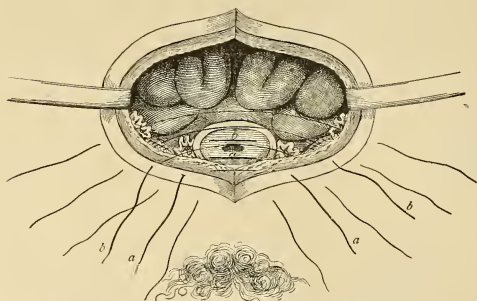
Peritoneum whipped over all, closing the wounds outside the peritoneal cavity.

face at this point can then be brought up and fastened to the abdominal wall in a similar manner as when the cervix was not removed.

This operation may be performed in any case which necessitates either a double ovariectomy or a hysterectomy, complete or incomplete, when in the opinion of the operator a subsequent prolapse of the vaginal vault may occur.

Another and excellent modification of this operation is, after the uterus has been removed by amputation at or below the internal os to fix the cervical stump to the abdominal wall at the lower angle of the abdominal incision by means of two silkworm-gut sutures passed through the full width of the cervix from side to side, and the free ends brought through the peritoneum, muscles, and deep fascia of the abdominal wall, where they are securely tied together, cut off short, and the knot buried when the incision is closed. The opened broad ligaments should be closed by a continuous catgut suture on each side, preferably before the cervix is anchored by its fixation sutures. The abdominal wound is then to be closed in the usual manner. This operation is to be chosen when a very large

FIG. 204.



Fixation of Cervical Stump to Abdominal Wall after Hysterectomy. Heavy lines, *a, a*, and *b, b*, indicate sutures passing into fascia, through muscle and peritoneum, thence through the amputated stump of the cervix, and finally through the peritoneum, muscle, and fascia of the opposite side. Light lines indicate sutures to close abdominal wound.

amount of relaxation exists, and the vaginal vault would not otherwise be lifted up sufficiently high to give the requisite support.

#### SUPRAVAGINAL HYPERTROPHY OF THE CERVIX.

The exact causes of this condition are unknown. It will be remembered that in early infancy the cervix alone exists, there being no corpus. It is possible that some excitant gives the cervix a false start about puberty, and it grows in an entirely disproportionate degree. The condition is to be distinguished from the other forms of cervical hypertrophy already described. It is characterized by an inordinate hypertrophy of that portion of the cervix which is attached to the bladder. So great is this hypertrophy that the increased weight of the uterus causes it to prolapse. The condition is peculiar to the nulliparous or primiparous, and is only occasionally found in women who have borne children. With the exception of acute prolapse produced by violence, this is the only form found in nulliparous women. The uterus descends because of its great weight. As it comes down displacement of the upper part of the vagina takes place first, whereas in the prolapse of the multiparous the rectocele and cystocele precede the descent of the uterus. When the prolapse has become complete so that the entire vagina is turned inside out, yet will a part of the fundus remain within the pelvic cavity. The essential pathological condition is one of hypertrophy of the cervix above its insertion into the vagina. This is not due to inflammatory action, but is rather an excess of normal elements.

The changes in the vagina and bladder are here the same as in the other form of prolapse. Owing to the small size of the vulva the tumor is constricted above at first, but in long-standing cases the vulvar orifice is fully distended. The base of the tumor is above, the apex below. The sound in the urethra and finger in the rectum show that the corpus lies between. The sound in the uterus will demonstrate its great length. As the patient lies on her back the marked difference in shape between the two kinds of prolapse becomes apparent. Here the pelvic floor is intact, and there is no true rectocele, no redundant vagina. Consequently there is absence of that puffy ending to the mass which is observed in the prolapse of *multiparæ*. In prolapse due to cervical hypertrophy the vaginal walls leave the cervix at an acute angle. The cervix is not lacerated, but rather conical.

SYMPTOMS.—These are the same as those of the other forms of chronic prolapse. Reduction is not as easy as in true prolapse, owing to the greater amount of uterine tissue relative to the size of the vagina, and complete replacement within the body to the length of the vagina is not usually possible. Straining does not materially increase the displacement, and, conversely, the dorsal decubitus does not lessen it. The general mobility is less than in true prolapse. The physical characteristics are stated above.

TREATMENT.—This must remain purely of a surgical nature. Palliative measures which afford relief in true prolapse are here useless. The cervix must be removed by high amputation as described in the chapter on Malignancy, so that sufficient tissue may be taken away. While the wound is healing the uterus must be kept in the pelvis by vaginal tamponade of gauze. After the union is firm and the sutures are removed the anterior and posterior walls may be narrowed by making on each an oval denudation. The immediate decrease in size obtained does not represent the ultimate decrease, for involution of the organ proceeds some time after the operation of amputation, and the uterus continues for some time to get lighter and smaller. If necessary at a subsequent time hysteror-rhaphy may be performed.

#### INFRAVAGINAL ELONGATION OF THE CERVIX UTERI.

Infravaginal elongation of the neck of the uterus occurs as a complication of prolapsed uteri, of lacerations of the cervix, and

as a congenital condition. The elongation in the first two varieties is merely apparent, and will not be considered.

In prolapsus, as the uterus descends, the vaginal vault folds back over the supravaginal portion of the cervix and gives it the appearance of actual elongation. By placing the patient in the knee-chest position the uterus falls back into the pelvic cavity, the uterus and vagina assume their natural relations, and the apparent elongation of the cervix disappears, showing at once the true condition.

In lacerations of the cervix one lip is oftentimes partially absorbed and everted, giving the cervix the appearance of being elongated.

Congenital elongation of the cervix is comparatively rare. The narrow conical cervix of a non-fully-developed uterus is often mistaken for this condition. Such a cervix is really not elongated, but is seemingly so from its peculiarly narrow, tapering shape.

A true elongation of the cervix is always congenital. It may consist of an increase in length from half an inch to a protrusion from the vulvar orifice. Frequently the examining finger comes in contact with it immediately on passing into the vagina.

FIG. 205.



Elongation of Infravaginal Portion of Cervix.

The symptomatology consists wholly in sterility, unless the descent be sufficient for its protrusion into the vulva, when the presence of the tumor will usually be detected. Under these circumstances coition would materially be obstructed. The diagnosis is easy. It may be mistaken for a prolapse, an inversion, or a polypus. A digital examination of the vagina will show the tumor to be continuous with the true cervix, and in no way different from it. Inspection as well as examination by the finger discloses the os. A bimanual examination with the finger in the rectum will reveal the corpus

uteri in its normal relation and position and the vaginal mass perfectly continuous with it. These points being ascertained, there can be no excuse for a mistaken conclusion.

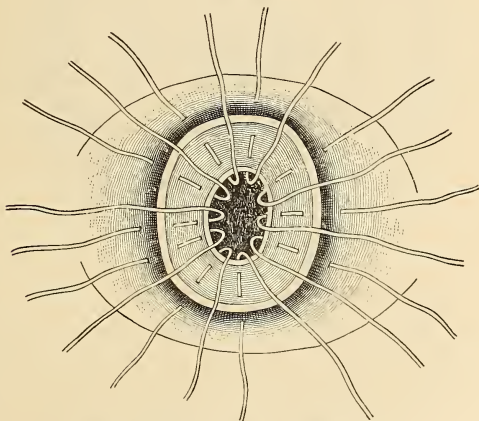
The treatment consists in a simple or wedge-shaped amputation of the cervix at a point about an inch from the vaginal attachments. A description of the operations will be found below.

#### PLASTIC OPERATIONS.

The partial extirpation of the cervix may be performed by two methods: either by a simple amputation of that part of the cervix projecting into the vagina or as a modified wedge-shaped excision.

*Simple amputation of the cervix* is less desirable than that by the wedge-shaped excision, on account of the greater accompanying

FIG. 206.



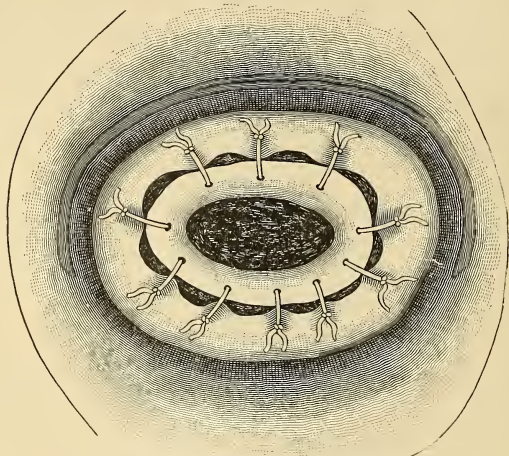
Simple Amputation of the Cervix, stitches in situ.

hemorrhage and the greater difficulty in covering the stump. The operation is performed as follows: The cervix is exposed by a perineal retractor and grasped by a double tenaculum or volsellum forceps. The labia are held apart by two other retractors, and the womb is then drawn down as far as the elasticity of the uterine ligament will permit. The farther this is possible the easier is the operation. Great care must be observed in applying traction, however, when inflammatory changes coexist in the adnexa. The mucous mem-



brane is incised by a circular incision, and the cervix severed as far as the canal. Before the entire separation it is advisable to place one or two stitches in the severed wall, leaving the ends long. These control the bleeding and act as tractors after the cervix has been completely severed. Tractors are applied by some operators before beginning the operation by passing a strong silk thread

FIG. 207.



Simple Amputation of the Cervix, stitches tied.

through the cervix above the field of amputation. The womb is now held fast by the tractor, the separation completed, and the sutures quickly placed, radiating from the cervical canal like the spokes of a wheel. The union of the two mucous surfaces over the stump is facilitated if the needle be introduced in the cervical mucosa, brought out midway between the cervical mucosa and the vaginal mucosa, and again introduced through the vaginal mucosa. As the circumference of the circular edge of the vaginal mucous membrane is much larger than that of the mucous membrane of the cervical canal, and the tissues of the cervix are very hard and unyielding, exact coaptation and a smooth line of suture are never attained. The vaginal mucosa is always thrown into folds radiating from the cervical canal, but good union is ultimately obtained.

*Wedge-shaped Amputation of the Cervix.*—The uterus is curetted, irrigated, but not packed. Pulling the cervix down by means of one pair of bullet-forceps fastened into the centre of the anterior lip and one pair in the posterior lip, the operator splits the cervix

FIG. 208.



Profile of the Wedge-shaped Amputation of the Cervix Uteri, sutures in place.

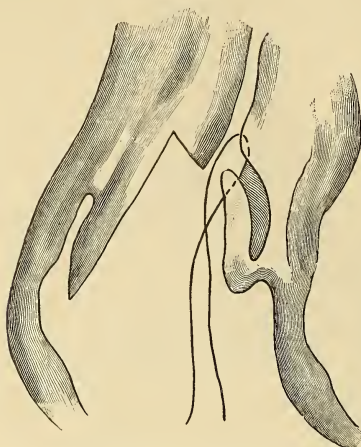
from side to side. The cut extends from the internal os, or a little higher than the amputation is to go, out upon each side to the vaginal junction. This produces two flaps, an anterior and a posterior. Upon the anterior flap, at a point as high as the amputation of the mucous membrane of the cervix is to extend, the operator cuts into this flap for a depth of a quarter of an inch across the entire face of the flap. The knife is now drawn across the vaginal face of the anterior flap, and this cut is made to reach the bottom of the first. By this last procedure a wedge is removed from the anterior flap, and the anterior is converted into a double flap with a shorter portion or "bench," made by the first cut, and a larger portion composed of the unamputated part of the anterior flap.

The same manœuvre is employed upon the posterior flap.

A needle is now entered upon the anterior flap at the centre of the cervical canal, passing entirely beneath the "bench." It is

withdrawn, and is inserted into the raw surface of the anterior flap, and emerges at the edge of the vaginal covering of this portion.

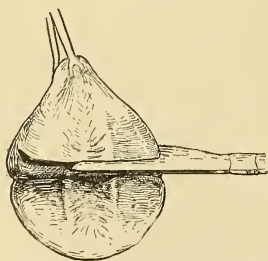
FIG. 209.



Profile of the Wedge-shaped Amputation of the Cervix Uteri, sutures ready to tie.

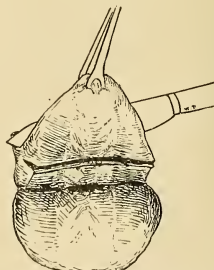
Two more sutures are similarly passed, one upon each side of the first. When these sutures are tightened it will be seen that the vag-

FIG. 210.



The cervix has been split bilaterally, and the anterior flap is held up. The knife is cutting the "bench" upon the anterior flap. (Sketched from nature.)

FIG. 211.

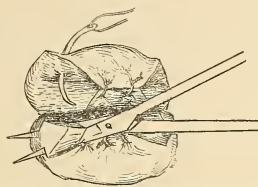


The knife is amputating a portion of the anterior lip by a cut which joins the cut forming the "bench." (Sketched from nature.)

inal face of the anterior flap is folded over upon the anterior cervical mucous membrane. This makes provision for the anterior portion

of the future os externum. The same thing is done upon the posterior flap, and the entire new external os is made. It will now be seen that the lateral portions of both "benches" are redundant. These are cut away with scissors down to the bottom of the incision,

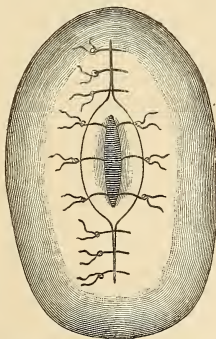
FIG. 212.



The middle sutures have been inserted on the anterior lip, and the redundant "bench" at each angle is cut away. Upon the posterior lip the scissors are cutting away the excess of the "bench."

so that at the angles there will remain but two smooth flaps, an anterior and a posterior. These are approximated by sutures passed from before backward, each suture being entirely buried. In applying these through-and-through sutures it may be necessary to bring the needle out several times at one sweep. The needle cannot em-

FIG. 213.



Wedge-shaped Amputation of the Cervix, sutures tied.

brace all the tissue of both lips of the cervix. The first introduction and withdrawal of the needle is shown in Fig. 212.

When the operation is completed the appearance will be as shown in the illustration (Fig. 213).

If, after completing the external os upon each lip, the "benches"

were left undisturbed, the through-and-through sutures upon each side of the cervical canal would bring together four projections of tissue. To avoid this and limit the possibility of failure to get union, the benches upon each side of the canal are cut away as described.

Having completed the operation and holding all the sutures to steady the cervix, the canal is gently dilated, the uterine cavity again washed out with salt solution, and packed with iodoform gauze. The sutures are now tied and their free ends cut off. The vagina is snugly packed with iodoform gauze. On the third day the vaginal dressing is removed and the uterine packing withdrawn. The uterus is not again packed, but the vagina is.

The vaginal dressing is changed once in three days, and the sutures are removed in from ten days to three weeks. If the vulvar orifice be tight enough to retain the iodoform gauze dressing within the vagina, the patient is allowed out of bed in six days. But if there be risk of dropping the vaginal dressing, so that mobility of the uterus will follow, she had better remain in bed until the sutures are removed.

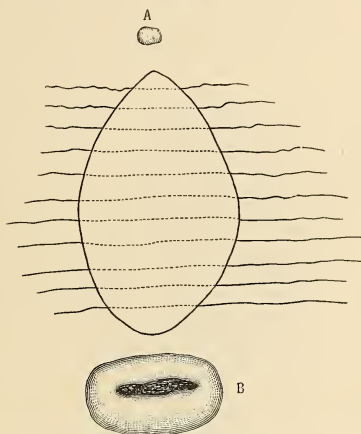
The operator seeks to remove two-thirds of the hypertrophied vaginal portion of the cervix. He leaves none of the diseased tissues, cysts, etc. which trachelorrhaphy fails to remove, because of the necessity for leaving a central portion upon each lip which that operation requires in order that a cervical canal may be retained. Subsequent pregnancies progress normally so far as the cervix is concerned. It will be further noticed that this operation provides a cervical canal slit-like in form, and not a round tubular canal, such as is secured by trachelorrhaphy. Whenever there is much cervical hypertrophy of a chronic character, with or without laceration, this operation is recommended.

Where a purulent endometritis coexists with a degree of cervical disease necessitating an amputation, it is not wise to curette and amputate at the same sitting. Either the curettage should be done a week before the amputation, or the operator should control the endometritis by means of irrigation with large quantities of mild antiseptics, such as boric-acid solution, together with the use of gauze tamponade of the uterus, before doing the amputation.

*Anterior Colporrhaphy (Sims').*—A point just posterior to the urethra is marked, and another in front of the cervix. With tenacula the lateral walls of the vagina, midway between cervix and

urinary meatus, are brought together. If they can be approximated too readily, the tenacula should be placed farther to the sides. The object is to catch up the sides of the anterior vaginal wall at points which may be approximated without too much strain. These being determined, they are marked. The four points thus chosen are united by an oval line, the greatest diameter of which is at the middle of the vagina. But this rule is not invariable, and the greatest width may be made where there is the most slack. Den-

FIG. 214.



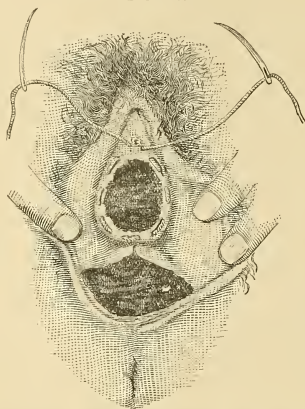
Sims' Anterior Colporrhaphy, stitches in situ: A, urethra; B, cervix.

udation is made by cutting with scissors. The operation is exceedingly simple and easily performed. The sutures are catgut and are passed from side to side. A double row of continuous sutures is used, the first row being placed entirely within the denuded surface, narrowing it fully one-half and removing considerable of the tension on the row approximating the mucous-membrane edges. The second row brings the edges of the incision together, burying the former suture. This is the preferable operation when it is desired merely to narrow the vagina. It does not foreshorten it, as does Stoltz's operation. It is a valuable adjunct to other procedures adopted for repair of the pelvic floor and reduction in the calibre of the vagina.



*Colpo-perineorrhaphy* (Hegar).—The object of this operation is to unite the separated ends of the levator ani muscle and pelvic fascia, to push the rectocele upward, and to narrow the vagina. Although the surfaces denuded by this method do not resemble the freshly-torn perineum, yet it must not be overlooked that we deal with torn perineia when they have acquired two elements never present in fresh tears—viz. the rectocele and retraction of the divided muscular and fascial edges. We carry out this indication to such an extent that we have extended the line of denudation higher than Hegar does. The divergence between the separated fibres of the

FIG. 215.



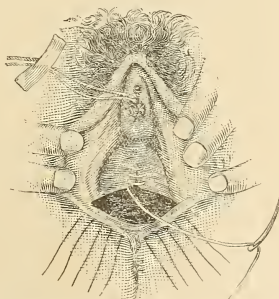
Stoltz's Operation for Cystocele and Hegar's Operation for Rectocele.

levator ani and fascia is very apparent upon parting the labia in old cases, and these lines constitute the two depressed lateral angles. These two angles are near together at the vulval orifice, but diverge as they enter the vagina, until at the upper third they are not apparent at all. Between them is an elevation of greater or lesser prominence, which pouts out into the vulval orifice upon straining. This is the hernia of the rectum covered by the posterior vaginal wall. There are two parts of Hegar's operation—that which narrows the vagina, and that which approximates the muscular fibres and fascia. The former is entirely intra-vaginal, the latter partly vaginal and partly perineal. The sutures for the former are all intra-vaginal; those for the latter are vaginal and perineal.

At a point corresponding to the former fourchette, and above the level of the "angles," the mucous membrane of the vulva is caught by forceps and nicked with scissors. The same is done on the opposite side. High up on the posterior vaginal wall, above the rectocele curve, a similar mark is made. The latter is joined to the two former by a light linear touch of the scalpel. The vulva margin is caught in forceps, and from its lower circumference a strip of tissue is removed to a point on the opposite side at a level with the first. This manœuvre is repeated until the denudation is complete, each successive strip being shorter than the preceding. Denudation completed, all bleeding from arterial branches must be checked by ligature with very fine catgut. Unchecked hemorrhage will produce hematomata and interfere with union.

When the tear has extended through the sphincter the procedure is identically the same; only the denudation should extend downward, so as to uncover the edges of the sphincter. When the recto-vaginal wall is torn, again the denudation is made in a triangular form, the tear in the rectum running through the centre of the denudation. In such cases the apex of the denudation must be at least half an inch above the upper margin of the tear, even though it be next the cervix. If this amount of tissue is not taken, the perineal part may close nicely, but leave a recto-vaginal fistula.

FIG. 216.



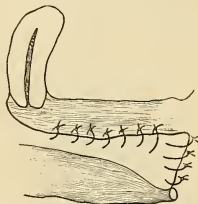
Suture Tied in Stoltz's Operation for Cystocele. Stitches in place ready for Tying in Hegar's Operation for Rectocele.

In passing the sutures a Hagedorn needle and holder are best. The first sutures passed are those in the vagina. They are of catgut, but may be of silkworm-gut or silver wire if subjected to much tension.

They are entirely buried, and are passed from side to side, one finger in the rectum guiding the needle. The continuous suture is inadvisable, but interrupted sutures should be used. When the suturing has proceeded so far as to bring the last stitch passed through the middle of the rectocele—*i. e.* about three-quarters of an inch from the base of the triangle—the needle is threaded with heavy silk-worm-gut. The lowest suture is passed first, the needle entirely buried. The caution is necessary not to enter the needle too far out on the skin, but it should be just at the edge. Four or five of these perineal sutures are passed, the last or uppermost one extending on the rectocele, up to the track of the last catgut suture, but not interlocking with it.

When the fibres of the sphincter ani are torn, the lower margin of the denudation should extend above a quarter of an inch on each side, below the lines of junction of the anal mucous membrane and the cicatricial tissue. In these cases there is always more or less rolling out of the sphincter ends, and these lines may be readily

FIG. 217.



Profile View of Hegar's Operation of Perineorrhaphy.

discerned. In such cases the lower two sutures approximate the sphincter fibres.

Where the recto-vaginal septum is torn a continuous suture should be passed from the rectum, from above downward to unite the lacerated borders. This converts the complete into an incomplete laceration. When tied the knot of this suture is at the anal margin. All sutures being passed, the next step is to stretch the sphincter ani so as to paralyze it entirely. This is not done where the recto-vaginal wall or sphincter is torn. The suturing brings together fascia and muscle which perhaps for years have been separated and from disuse have atrophied. Hence such approximation is accomplished under great tension, which latter

pulls against the sphincter ani, tending to separate its fibres. This muscle involuntarily contracts against the attempt, and produces a great deal of pain. In addition to this indication, stretching allows of the more free escape of intestinal gas. After the sutures are tied a stout drain of iodoform gauze is introduced into the vagina and projects from the vulva. The catgut sutures are tied in three knots, the silkworm-gut in two. Both should be cut to leave ends half an inch long. Iodoform is dusted on the perineum, and gauze placed over the sutures and held in place by borated cotton and a T-bandage. The vaginal gauze is removed at the end of forty-eight hours, and a vaginal douche of saturated solution of boracic acid given. Another drain is not introduced unless there be special indications for it, such as bleeding or sepsis. Twice a day the nurse should irrigate the perineal sutures with bichloride solution, 1:4000.

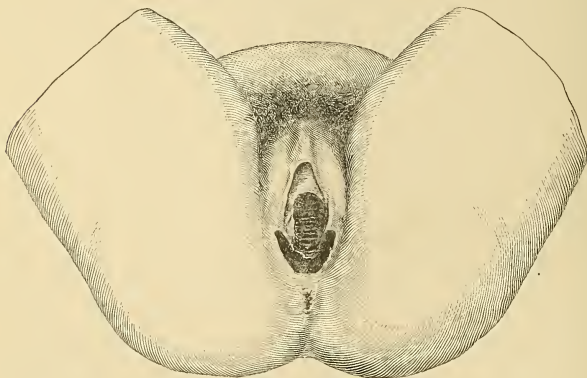
The patient should be given vegetable cathartic pills the second night, so as to operate on the third day. When she has the stool it may be softened by small enemata of saline solution. After this first stool others should be had every second day. The sutures are removed about the tenth day. If there be much tension, they may cut into the flesh. Alternate ones may be removed then on the seventh day. Scrupulous cleanliness is imperatively necessary throughout the whole after-treatment. The diet should consist largely of soups, vegetables, and fruits. Opium is not needed. There is no necessity for confining the legs after the patient has recovered her senses from the narcosis, and she may be allowed to lie on her side. Confinement to bed for at least two weeks is necessary, and longer if the operation be part of the procedure to correct prolapse.

When the recto-vaginal wall has been torn and repaired, the after-treatment is somewhat different. As little disturbance as possible of the pelvic floor is here demanded. Therefore these patients should have received a most careful preparation as regards emptying the entire intestinal tract before the operation. After the operation they should receive liquid food only for three days, with cooked fruits. The bowels may gently be assisted by enema if they tend to move, but if not laxative pills may be given on the third night. In these cases, if the bowels are too fluid, particles are apt to leak into the wound, and if too hard, the stool may separate the united edges of the rectum. Rectal tubes, whether covered by

gauze or not, are of no use, but rather harmful where there has been complete laceration.

*Flap-splitting Perineorrhaphy.*—The objections to this operation are twofold: It in no way narrows the vagina, and it only partially approximates the levator ani fibres. Its field of usefulness is very limited indeed. Practically, it is applicable to those cases in which only the superficial and most exterior fibres of the perineum are torn. That by means of it the separated sphincter fibres can be united is undoubtedly true. But where a tear is so extensive as to produce rectocele prolapsus the levator ani also is entirely separated. To unite the sphincter by flap-splitting is but part of the work indicated. In no way possible can this operation narrow the vagina, abolish a rectocele, or bring together the separated fibres of the pelvic fascia. It should be performed only in the case of a patulous

FIG. 218.



Flap-splitting for Incomplete Laceration of the Perineum; Relaxation of the Vaginal Outlet.

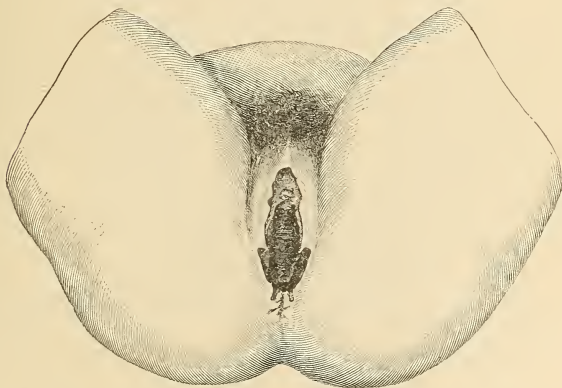
vulval orifice without rectocele, in the case of either complete or incomplete laceration of the perineum.

The operation is performed with the patient in the dorsal position. The instruments required are a sharp-pointed pair of scissors bent on the flat, a handled perineum needle, and a tenaculum. Occasionally a pair of hemostatic forceps will be necessary to temporarily control bleeding.

FOR INCOMPLETE LACERATION.—The index finger of the left hand

being introduced into the rectum as a guide, the point of one of the blades of the scissors is thrust into the recto-vaginal septum, midway between the vaginal opening and the anus, to the depth of half an inch or more, care being taken that the instrument enters neither the vagina nor rectum. From this point the incision is made, first to one side and then to the other. The line of the incision is carried on each side outward and upward along the boundary-line between the vaginal mucous membrane and the skin of the labium. It is extended up the labium to that point at which it is desired the new vaginal floor shall exist; this point is usually that at which the lower caruncle (remnant of the hymen) exists, which point, in addition, can be located by the existent scar-tissue. The depth of the incisions tapers gradually until they reach the highest point

FIG. 219.



Flap-splitting for Complete Laceration of the Perineum; Laceration through the Sphincter Ani Muscle.

on the labia. When completed the incisions form the elliptical figure U.

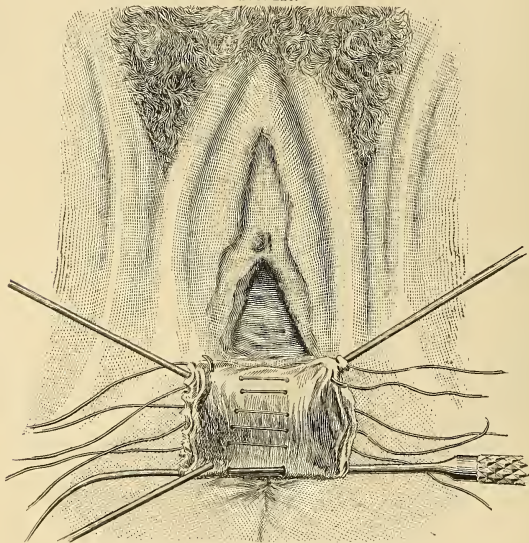
**FOR COMPLETE LACERATION.**—Where the sphincter ani muscle is involved in the laceration the method of repair is precisely similar, with the addition of two small slits. They are made by cutting down each side of the anus to the ends of the retracted sphincter muscle, beginning the cuts at the curve of the original incision. Their length and depth are variable, depending upon the position of the retracted ends of the sphincter muscle, which must be exposed,



so that when they are brought together the two ends may unite. When completed the incisions present the appearance as shown in Fig. 219.

With the sides of the wound well separated the sutures are passed transversely. Beginning at the middle of the opening, the handled needle is made to pierce the skin about one-eighth of an inch from its cut edge, is carried three-quarters of the way to the bottom of

FIG. 220.



Introduction of Sutures in Flap-splitting Operation.

the wound, where it is made to emerge, and, being reintroduced at a point directly opposite the point of emergence, is carried under the tissues of the opposite side until it appears on the skin surface at a point directly opposite that at which it was first introduced. The eye of the needle is now threaded with a silkworm-gut suture and the needle withdrawn, dragging with it the end of the suture. Several similar sutures are passed above and below this median one. The topmost suture must pass through the vaginal flap as it is held up by a tenaculum; the lower suture, if the laceration be a complete one, must include both ends of the retracted sphincter muscle. The

corresponding ends of the suture being now tied, or, better, shotted, the pelvic floor is lifted up toward the pubis by the crowding in below of the gluteal tissues. The result forms a fair support to the vaginal outlet, but in no way has any influence on any injury done to the vaginal floor.

### INVERSION OF THE UTERUS.

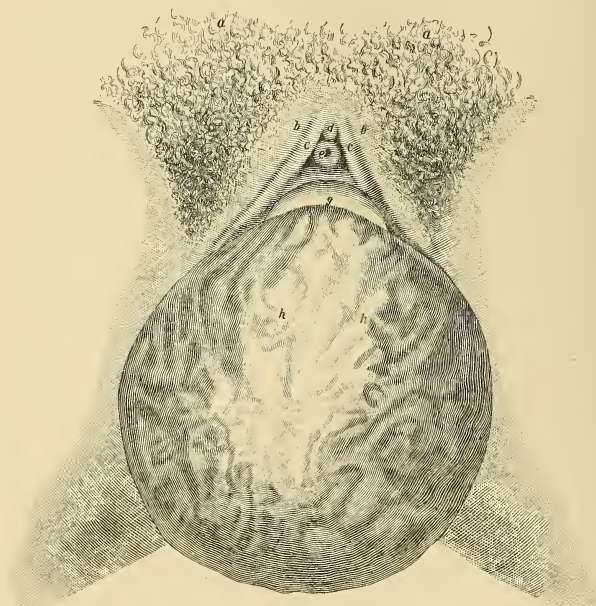
This fortunately rare complaint is most often a complication of labor, and at times is fatal. But cases often live, and, as the condition results also from neoplasms, such as fibroids, they come to gynecologists as cases of chronic inversion. As such they will be described.

That inversion may occur in the virgin uterus is undoubtedly true, but the vast majority of cases result from childbearing. It is necessary that the cervix be large and patulous, the fundus heavy and soft to enable the uterus to turn inside out, for such is, in reality, the condition in inversion. Continuous severe hemorrhage marks most cases. The patients are anemic, suffer great pain and bearing-down in the uterus, and frequently there is a profuse leucorrhœal discharge, often purulent. They are very generally incapacitated for their work, and as time progresses they become more and more disabled by exhaustion. Examination shows a tumor symmetrical, firm, and of reddish color, filling the whole or part of the vagina as the inversion is partial or complete. Occasionally a fibroid polyp of greater or lesser size is attached to the inverted fundus, and this has probably been the exciting cause of the displacement. At first, in the early stages, the cervix is open and is occupied by a loop of intestine, but later it becomes contracted and merely contains the Fallopian tubes. The condition may also be associated with prolapsus, in which case the tumor may protrude from the vagina, under which circumstances it is not infrequently mistaken for prolapsus uteri. Generally the tumor is retained in the vagina. Inversion having taken place, the cervix contracts, and strangulation and gangrene of the uterus may result. Cases have been reported of spontaneous cure by the fundus sloughing away in consequence of the constriction to its circulation caused by the cervix squeezing it tightly; also by the organ returning to its normal condition. Atlee reports an interesting case of this kind, where the inverted uterus was reduced by persistent and long-continued efforts at coition on the part of the husband after all other treatment had

failed. The woman became pregnant and was delivered of a healthy child. The uterus had been inverted for years. Cases progress to a fatal issue from shock, due to hemorrhage, and progressive asthenia, sepsis, or peritonitis. The usual cause of death in the chronic cases is exhaustion from the continuous loss of blood.

The DIAGNOSIS must be made by examination, and is occasion-

FIG. 221.

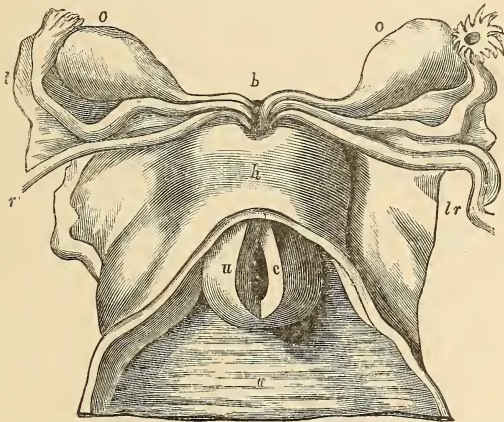


Inversion of the Uterus; *a*, mons veneris; *b*, the larger labia; *c, c'*, nymphæ; *d*, clitoris; *e*, meatus urinarius; *g*, anterior border of the external os of the uterus; *h, h'*, the internal surface of the uterus turned outside.

ally very difficult, although usually the condition is readily determined by a vaginal exploration. The soft, uniformly-enlarged mass is felt filling the vagina, the upper end or pedicle of which is constricted by a ring of tissue, through which it is very evident that the mass protrudes. If that condition be made out satisfactorily, the true lesion can hardly be overlooked. Should there

be any uncertainty as to the diagnosis, the bladder and rectum should be emptied. Examination combined by means of a sound in the bladder and a finger in the rectum will demonstrate the absence of the body of the uterus from its normal position, and the dimple of the inverted cervix will be felt from above. The tumor itself is firm, smooth, and the surface bleeds easily. The invariable diagnostic signs are the opening of the cervix above, which can be reached by the rectum, even though it may not be felt through the abdominal wall, and the very small openings of the tubes, at the sides of the base of this tumor, together with the

FIG. 222.



Complete Inversion: *v*, vagina; *u*, incised uterus, showing the cavity; *b*, border of the inverted portion; the round ligaments, the Fallopian tubes, and the ovarian ligaments are drawn in; *lr*, round ligaments; *t*, Fallopian tubes; *o*, ovaries; *h*, cervix covered by peritoneum.

constricting band of cervix, beyond which the finger cannot pass at any point about the pedicle of the tumor as felt in the vagina.

The PROGNOSIS is unfavorable, on account of the constant loss of blood, it being only a question of time as to how long the patient can stand the drain.

TREATMENT.—Chronic inversion is exceedingly difficult to cure. Gentle, continuous taxis, at the same time using some force, is the preferable method first to be tried. It is made as follows: The hand in the vagina grasps the fundus and exercises firm pressure upon it. The hand above, on the abdomen, attempts to distend the



cervix and make counter-pressure, while the fundus is squeezed and pushed up. Many failures should not discourage the surgeon, but the pressure should be gradual and steady, care being taken not to use undue force, as must be the case in all efforts to overcome the contraction of unstripped muscular fibre. Peritonitis and death have been known to result from rough and too prolonged efforts in this direction. If the cervix yields, it yields rather suddenly. The attachments of the vagina to the cervix are of aid to the manipulations, and the tumor can be so pushed up as to render the vagina tense during the manœuvre. The operation is best performed with the woman under the influence of an anesthetic. Repeated failures after conscientious effort compel us to consider continuous elastic pressure, removal of the organ, or, possibly, attempt at replacement by Thomas's method.

Taxis having failed, continuous elastic pressure must be tried. The bladder and bowels being empty, the uterus is pushed up if prolapsed, and a Braun's colpeurynter, previously soaked in a saturated solution of boracic acid for several hours, is introduced. This is then injected with tepid water until it fills the pelvis very snugly.

The contents of the colpeurynter are to be gradually increased. It should not be left in too long, but once a day should be removed for a few hours, the parts and the colpeurynter cleansed, and the latter reintroduced. Few cases will resist this method of treatment. The object of the treatment is to exercise a continuous pressure, not sufficient, however, to obstruct circulation to too great an extent. During the treatment the patient should be kept in bed; indeed, the pain produced by the colpeurynter is pretty severe, and would of itself confine the woman to bed. Morphia for its relief is indicated, but should not be pushed too far.

The only caution to be made is that the physician should not become too easily discouraged in his attempts to replace by taxis and the colpeurynter.

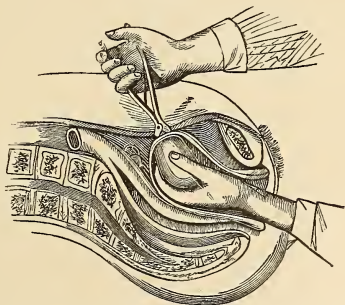
It is now twenty-three years since Thomas advocated opening the abdomen and dilating the cervix, and in that time the mortality from celiotomy has fallen to a very small percentage; therefore when taxis and the colpeurynter have been given repeated tests and have failed, Thomas's operation may be tried, although without much prospect of success. If replacement cannot be made by Thomas's method

very promptly, at the same sitting the organ can be removed by abdominal hysterectomy in a few minutes.

*Thomas's Operation for Inversion.*—Thomas succeeded with one case, and lost his second from infection—something which now may be prevented. Other successful cases have been reported. A consideration of the technique of the operation and the changes in the uterus gives promise that the mortality can be kept below 10 per cent., but the proportion of successes is very slight.

The patient is prepared for both a vaginal operation and a celiotomy. The special instrument required is Thomas's dilator. It might be modified usefully by making the flanges wider, so that at the act of dilating pressure upward may be made, thus contributing to the rolling out of the inversion. The dilating portion need not be so long. A short abdominal incision only is necessary, merely sufficient to ascertain the condition of the intraperitoneal tissues. The abdomen being open, the operator's left hand is introduced into the vagina and the mass pushed up to the incision. The dilator is introduced and the upper part of the constriction dilated at the same time. This is an important observation by Thomas—

FIG. 223.



Thomas's Operation for Replacement of the Inverted Uterus.

that the reduction takes place in a manner exactly the reverse of that in which the inversion occurred. In this way each fraction of the constriction is successively dilated, and the inversion is reduced in stages beginning with the cervix. The caution is necessary to so apply the instrument as not to wound the tubes. Because of the



possibility of this it might be better to try the fingers arranged into a cone before using the dilator.

*Vaginal amputation of the corpus uteri* is at no time justifiable. If conservative methods fail to reduce the deformity, the uterus must be removed in toto. Should the abdomen be opened for a trial with Thomas's operation, and that fails, as has usually been the case, removal of the wound through the abdominal opening is the proper procedure. Should it be decided from the first not to try the Thomas method, but to remove the displaced organ, vaginal hysterectomy is the proper procedure to be adopted.

To recapitulate, gentle but well-directed efforts at taxis are to be first tried, with the patient under an anesthetic. Should this not accomplish the object at a single sitting of an hour, or show very decided signs of ultimate success, continuous elastic pressure by means of the colpeurynter or Aveling's repositor is to be tried. Should this give no promise of success after several days' trial, vaginal hysterectomy is the most rational procedure.

## MALIGNANT DISEASES OF THE FEMALE GENITALIA.

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THE term "malignant" is applied to those affections of the female genital organs which progress toward a fatal termination and have a tendency to return after removal. They are attended with a characteristic rapid involvement of the surrounding tissues and a marked general infection, as is evidenced by cachexia, debility, and the metastatic involvement of the internal organs.

At first these diseases are local, and if early recognition be followed by immediate removal, a perfect cure may in many cases be expected. After attaining a considerable size and involving the inguinal or post-peritoneal lymphatic glands their removal is simply palliative.

The malignant diseases to which the female organs of generation are subject are, in the order of their frequency, carcinoma, epithelioma, and sarcoma. Occasionally a mixture of carcinoma with sarcoma is observed.

### MALIGNANT DISEASES OF THE EXTERNAL GENITALS.

Carcinomatous tumors are frequently observed in women in the organs of generation, but malignant tumors of the external genitals are more rarely met with.

The forms of malignant tumors of the external genitals, in the order of their frequency, are, epithelioma, carcinoma, and sarcoma.

*Epithelioma* develops usually on the lower part of the inner surface of the greater labium in the form of small, round, hard nodules which project above the level of the mucous membrane and have a rough, uneven surface. They are usually of a whitish color, and may remain for a long time unnoticed. They grow slowly in their incipency and are painless. Sooner or later the vascular supply to the tissues is increased, and the growth becomes more rapid, the

superficial epithelial layer is lost, ulceration begins and spreads to the surrounding tissues, and the original seat of disease progressively increases in area. The rounded form of the original nodule is preserved for a long time by the even extension of the induration. The ulcers are surrounded by hard, raised margins of a bluish-red color, covered with rough granulations, and bathed in a purulent ichorous secretion with unpleasant odor. The ulcers, later in the course of the disease, may become the seat of papillary excrescences which at times attain a large size.

As soon as the purulent sore is formed the induration spreads more rapidly, and usually in the direction of the long axis of the greater labium, and upon its inner surface. It is exceptional for it to extend beyond the myrtiform caruncles or to the abdominal wall.

In the course of its growth the epithelial cancer usually first involves the lesser labium, then the prepuce of the clitoris and the clitoris itself. These parts redden, become swollen and indurated, and then ulcerate, forming a long indurated ulcer of a dirty-red color, with irregular edges, extending from the lower part of the greater labium to the mons Veneris. It is rare for the disease to spread to the labium of the opposite side.

The inguinal glands do not become infiltrated until the ulcerated sore has existed for a long time. When this occurs the disease rapidly attacks the deeper tissues which up to this time have not shared in the involvement. The entire labium assumes a dark-red color and becomes swollen, hard, and painful. The epithelial sore advances to the perineum and the thigh, forming a deep ulcer with an irregular surface. One or more of the inguinal glands may harden, take on a rapid growth, ulcerate through the skin, and form a sore extending deeply into the tissues.

The ETIOLOGY of epithelioma is but little known. It occurs only in the later years of life, and most frequently about the time of the menopause. Heredity appears to have no influence in its occurrence. While it usually has its seat on one side of the vulva, it has been observed primarily on both labia. Blows and falls upon the labia have been referred to as causes, but it is difficult to decide what causal relations, if any, they hold to the disease. The pruritus which always accompanies epithelioma of the vulva, and is most violent in the beginning, has been by some authorities considered not a symptom of that disease; they contend that the epithelioma is a result of the continuous rubbing and scratching of the parts for the

relief of the pruritus. This theory, however, has gained few converts, and is most probably not the correct one.

Epitheliomatous nodules may exist for months without producing symptoms other than obstinate pruritus, or materially changing their form or size. As soon as ulceration begins the process becomes rapid, and usually causes death in two years. There is persistent pain, which is not so severe as in other forms of cancer. The patients suffer from insomnia, are wasted, and gradually acquire an earthy complexion. The appetite is almost completely lost. The secretions from the ulcerated surfaces are not so copious or so offensive as those from cancer. Hemorrhages may occur, but are not common. The loss of flesh and strength progresses rapidly, and the patients die, usually in about two years, from chronic septic infection.

The TREATMENT of epithelioma of the vulva consists in its early excision, including enough healthy surrounding tissue to ensure its complete removal. The use of caustics, at any stage of the disease, for the removal of the growths, cannot too emphatically be denounced as unscientific and untrustworthy, increasing the sufferings of the patients and giving them no assurance of complete removal. The use of caustics is nearly always followed by a quick return of the disease, whereas if the growth be early and freely excised, before there is involvement of the inguinal lymphatics, the chances for a perfect cure are, in some cases, fair. Even where glandular enlargement of the inguinal lymphatics is present, excision of the growth and removal of the chain of glands will most probably prolong the life and will certainly relieve the sufferings of the patient. If the infiltration has spread over the perineum and on to the thighs, or if the inguinal lymphatics have ulcerated, the treatment should be, naturally, palliative. For these advanced cases the use of compresses wet with a saturated solution of chlorate of potash has been recommended.

*Scirrhus carcinoma, sarcoma, and medullary sarcoma of the vulva* as primary growths are extremely rare. The point of origin of these tumors is usually the greater labium. Scirrhus carcinoma has been observed in the clitoris and in the tissues adjoining the clitoris. Sarcomatous growths may originate in the nymphæ. Medullary sarcoma has been observed to grow from urethral caruncle.

The growth usually develops as a deeply-seated nodule, which rapidly spreads toward the skin surface. The overlying skin be-

comes adherent and ulcerates, forming an irregular, uneven sore, secreting a copious purulent, ichorous discharge. It is a disease essentially of old age, occurring usually between the sixtieth and seventieth years.

The SYMPTOMS are much more violent than those of epithelioma. In the early stages there are pruritus, increased vaginal secretion, and the mechanical inconveniences of the tumor according to its situation. The pricking, tearing carcinomatous pains occur early. The purulent ichorous discharges are profuse. Copious, weakening hemorrhages frequently occur. The inguinal lymphatics are early involved. The patients, as a rule, rapidly decline in health, and soon die through progressive loss of strength and metastasis to the internal organs.

If the case is seen before extensive involvement of the inguinal lymphatics has taken place, the growth should be excised freely with the knife or removed with the Paquelin cautery. The operator should remove all doubtful parts, without fear of a too great loss of tissue. Unfortunately, most of these cases come under the gynecologist's notice when wide extension of the growth and the involvement of the lymphatics render the treatment only palliative and symptomatic. These cases then require the use of antiseptic and disinfectant washes to correct the fetor of the discharges, alum and Monsel's solution to control the hemorrhages, and the plentiful use of opium to render the patients' last days as comfortable as possible.

*Carcinoma of the urethra* is a very rare disease, and usually secondary to cancer of the external genitals or vagina. Carcinoma of the bladder rarely involves the urethra.

The TREATMENT consists in excision. If removal of the mass is not possible, the urethral canal should be kept open by the daily passage of the catheter. Should the growth become too extensive for this, an artificial vesico-vaginal fistula should be made to provide for the escape of the urine. Local cleanliness and anodynes for the relief of the pain are mainly to be relied upon when the disease has progressed too far for surgical relief.

Periurethral cancer develops in the form of nodules in the vestibule of the vulva near the urethral orifice, or in the cellular tissue along the sides of the urethra without involving its walls. The mouth of the urethra is usually secondarily involved. The nodules are at first hard, non-ulcerated, painful upon pressure, and occasionally the seat of lancinating pain. The pain usually first causes

their discovery. At times they are not observed until ulceration has occurred and hemorrhage invites search for its cause. The nodules rapidly infiltrate the surrounding tissues, filling the whole vestibule, following the course of the urethra to the neck of the bladder and to the pelvic fascia, and finally extending over the symphysis and descending rami of the pubis, and involving all of the included tissue.

The treatment is operative if early seen—palliative if there is extensive involvement.

#### MALIGNANT DISEASE OF THE VAGINA.

The vagina may be the seat of carcinoma, epithelioma, or sarcoma. The carcinomatous and epitheliomatous affections are usually secondary, while the sarcomatous are principally primary growths.

*Sarcoma of the vagina* appears either in the form of a circumscribed rounded tumor growing from the submucous tissue or as a diffuse superficial degeneration of the vaginal wall. Tumors of the first variety may readily be confounded with fibro-myoma, and the second form may be mistaken for carcinoma. The growth may occur as a small warty tumor, or as a rounded or oval nodule which may reach the size of a goose-egg. The usual seat of sarcoma of the vagina is upon the posterior wall. The circumscribed submucous sarcomata are usually composed of spindle-cells; they ulcerate late in their course, and occasion symptoms analogous to those of the fibro-myomatous tumors of the vagina. There is pain, especially at night, obstruction of the vaginal canal, and hemorrhage after ulceration has taken place.

The superficial sarcomatous degeneration of the vaginal wall occurs, usually upon the posterior wall as a small tumor, which slowly increases in size and resists treatment. Finally, it loses its mucous covering, and forms an ulcer with elevated edges and covered with readily bleeding granulations. Involvement of the inguinal glands does not take place until late in the disease. Hemorrhage is a prominent symptom, occurring after violent motion or excited by coitus or by straining at stool. The entire periphery of the vagina may finally become involved.

The DIAGNOSIS cannot be made with certainty without microscopic examination of pieces of the growth. A strong presumption of the presence of the disease is not, however, difficult to establish.



The PROGNOSIS is more favorable in the circumscribed sarcomata than the diffuse, on account of the greater probability of their complete removal, although it is extremely bad in both.

The TREATMENT in the circumscribed form is operation if seen before ulceration and lymphatic involvement has occurred.

In this, as well as in the diffuse form, the treatment is identical with that of carcinoma, if the disease has progressed beyond removal by the knife.

*Carcinoma and Epithelioma of the Vagina.*—Secondarily, the vagina is frequently invaded by carcinoma and epithelioma; it is rare, however, to find these growths occurring primarily. It may be involved by the extension of uterine carcinoma, of carcinoma of the rectum, vulva, urethra, least frequently of carcinoma of the bladder, and finally, as metastatic nodules following the removal of a primary cancer. The primary cancer of the vagina appears principally in two forms: papillary epithelioma, which is most frequent, or diffuse carcinomatous infiltration of the vaginal wall.

The first form appears as a circumscribed sessile growth, most frequently situated upon the posterior wall. The second form is a carcinomatous infiltration of the vaginal wall, usually circular in outline, involving large areas of tissue and occupying the mucous membrane and submucous layer. It may be of either the medullary or scirrhus type.

Concerning the ETIOLOGY very little is known. The cases occur with greatest frequency between the ages of thirty-one and forty. Young individuals are seldom affected. Traumatic insults—such, for instance, as the pressure of badly-fitting pessaries—have been urged as causes. But this opinion is unquestionably erroneous. We lay stress upon this point, because among the laity, cancer even of the womb is so commonly attributed to the irritating pressure of pessaries, that the physician is often much hampered in their use by the fears of his patient. Primary cancer of the vagina is extremely rare. In a large experience but three cases of it have been seen by the author. In each case the sore was just behind the cervix, yet in not one had a pessary ever been used by the patient. Of course to cancer of the womb the pessary can bear no causal relation whatever, because it does not come in contact with that organ at any point.

In the course of carcinoma of the vagina, in all its forms, there

is a rapid progress toward ulcerating degeneration of the tumor, while peripherally and upon its base the neighboring tissues are invaded. By the advancing destruction of the tumor the cancerous ulcer is formed which may readily perforate into the neighboring cavities. From the frequent seat of the neoplasm upon the posterior vaginal wall, recto-vaginal fistula is usually the first to form. The further extension in the lymph-channels involves, in sympathy, the lymph-glands in the pelvic connective tissue, and, if the growth is deeply seated, also the inguinal glands.

The SYMPTOMS consist principally of hemorrhage, ichorous discharge, and pain. Occasionally the patient complains of the mechanical inconveniences of stenosis and of obstruction of the lumen of the vagina, as impediments to sexual intercourse, or the disease may first be recognized during labor as obstruction in the birth-canal. Lastly, those disturbances arising from the involvement of the neighboring organs, the rectum and the bladder, may be the first clue to the disease.

The essential and never-failing symptoms are the anomalies of secretion—hemorrhage and the watery and ichorous discharge. These depend for their prominence upon the form and vascularization of the carcinoma and the stage in which it comes under observation. The hemorrhage usually first makes its appearance after coitus or after the straining at stool. Death occurs usually after spreading of the ulceration from the progressive debility caused by the hemorrhages and discharges. It may also occur in very vascular growths from hemorrhage. Pregnancy may occur in the course of vaginal carcinoma, and the growth then forms a serious complication in labor.

The requisites for the DIAGNOSIS of vaginal carcinoma are the presence of either a firm sessile tumor immovably fixed in the tissues, with an ulcerated surface, or an infiltrated ulcer. Serous or ichorous discharge is always present, and hemorrhage is easily produced by contact. Papillary epithelioma may appear as a cauliflower growth, and is to be distinguished from unusually large benign papilloma by the greater tendency to hemorrhage and the striking brittleness of its tissue. From sarcoma the differential diagnosis is to be made only by the microscope. It is of importance to determine if the carcinomatous growth be of primary or secondary origin. A thorough investigation of the neighboring organs and the position of the growth will determine this question.

The growth is only to be regarded as a primary vaginal carcinoma when rectum, vulva, bladder, and urethra are excluded as points of origin, and the portio vaginalis remains uninvolved or is attached only externally next to the vaginal growth, and no other distant organ is the seat of cancerous disease. The epithelial and papillary forms of cancer usually involve the vagina secondarily by extension of their growth from the neighboring organs by continuity of tissue. Carcinoma developing from infiltrated nodules may occur in the vagina by metastasis from distant organs, as cancer of the stomach.

Unfortunately, in most cases of cancer of the vagina it is impossible to remove the entire growth. Destruction of the mass has been fruitlessly attempted with the sharp curette, the galvano-cautery snare, and cauterization with the most varied corrosives. Yet under certain circumstances one is forced to employ them. When the tumor is so far circumscribed that its total extirpation with enough surrounding healthy tissue to ensure its complete removal is possible, this is the only procedure. The operator should not hesitate from fear of too extensive a wound to remove all suspicious tissue. Should the inguinal chain of lymphatics be enlarged, they too should be removed. Owing to the elasticity of these tissues it is often possible after extensive removal of the vaginal substance to unite the edges of the wound by suture.

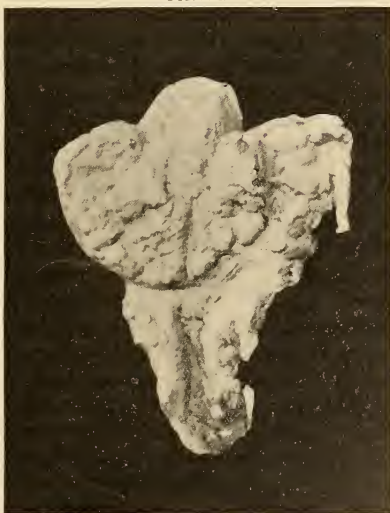
Usually the cases come under notice too late for operation. The **TREATMENT** is then palliative. The hemorrhage and discharge are best controlled by the destruction of the cancerous mass by the use of the curette, galvano-cautery, or corrosives. Great care must be exerted in applying these means that the bladder, rectum, or peritoneal cavity is not opened. Vaginal suppositories, containing equal parts of pure pepsin and salicylic acid—say, from five to ten grains each—have been found useful. Sometimes the dry powder is applied directly to the ulcer, and confined there by a tampon of cotton. This application is very irritating to the vulva and outlying genitalia, which should therefore be protected by a coat of vaseline or of zinc ointment. The hemorrhage may become very alarming, and require tamponing of the vagina with gauze wet in saturated alum solution or with absorbent cotton that has been wet with Monsel's solution and dried. Later in the disease the discharges will require suppositories of chloral and tannic acid, or douches of peroxide of hydrogen or permanganate of potash, to

correct their odor. The pains imperatively demand the use of narcotics, and, as in all cases of advanced cancer, these drugs should be given in increasing doses according to the effect upon the patient. There is no excuse for allowing these doomed women to suffer more pain than is necessary, and the physician is not doing his whole duty if he neglects to provide his patient with the comfort which opium gives.

#### SARCOMA OF THE WOMB.

*Primary sarcoma of the uterus* occurs anatomically and clinically in two forms—fibro-sarcoma, or sarcoma of the uterine parenchyma, and diffuse sarcoma, or sarcoma of the uterine mucous membrane. Both forms may consist of round or of spindle cells.

FIG. 224.



Sarcoma of the Body of the Uterus.

Fibro-sarcoma forms a more or less firm, occasionally soft, circumscribed, rounded tumor growing from the uterine parenchyma and resembling the fibroid tumor. Like these growths it may be submucous, subserous, or interstitial. The growth occurs in the

form of rounded nodules, of a rich cellular formation, which appear to have invaded the original tissue. When submucous or subserous, they form sessile tumors projecting into the cavity or upon the surface of the uterus. As interstitial growths they are imbedded in the tissues of the uterus and form thickenings of its wall. The isolated sarcomatous tumors are usually composed of round cells. The spindle-celled fibro-sarcoma usually occurs in disseminated nodules lying in the uterine parenchyma, but it may infiltrate equally the whole organ. It is rare for this growth to appear upon the cervix. Often the uterine fibro-sarcomata are the result of sarcomatous degeneration of fibro-myxomatous tumors.

The diffuse sarcomatous tumors grow from the connective tissue of the uterine mucous membrane, and are mostly composed of small round cells, seldom of spindle cells. They appear as very soft knotty or papillary growths upon the mucous membrane. They may occur in single areas or infiltrate the whole mucous membrane. The growth usually involves the uterine wall, which it penetrates, forming a tumor upon the peritoneal surface. Those intestines lying near become involved, adhesions are formed to the abdominal wall, and the neighboring organs are invaded by the disease. The soft round-celled medullary sarcomata may present themselves as polypoid growths attached to folds of the mucous membrane. They are grayish-white in color, resembling brain-matter, rich in blood-supply, and of soft consistency. The surface is usually necrotic, uneven, and dotted over with fungus-like masses. The necrotic surfaces are covered with dark-brown colored sloughs. These growths are closely related to the cancerous degenerations of the uterine mucous membrane. The cervical mucous membrane seldom appears to be the point of origin of the diffuse sarcoma.

Concerning the CAUSES of the origin of sarcoma little is known. It may occur at any age. We have observed it as early as the twentieth year and as late as the seventieth. But undoubtedly there is a special predisposition for the development of sarcoma at the climacteric period. There is no reliable proof, as is often asserted, that fibro-miomata undergo change into sarcoma. It is a disease which especially attacks nulliparæ. It has been remarked that diffuse sarcoma originates in the interglandular connective tissue of the mucous membrane, just as carcinoma of the body of the uterus develops from proliferation of the cells in the glandular element.



As the SYMPTOMS of the two forms of sarcoma differ essentially in character, they will be described separately.

The most prominent symptoms occasioned by the fibro-sarcomata are those caused by pressure according to the position and the size of the tumor. Pain resembling in character labor-pains, hemorrhages, and watery discharge are the cardinal symptoms. The pain may wholly be absent or be slight. It is occasioned by the attempts on the part of the womb to expel the mass, and is referred to the dorsal and hypogastric regions. Hemorrhage is first recognized as profuse menstruation, and does not change its character until a late stage of the disease. The discharge may be exceedingly profuse, of a bloody, serous, or watery character, and finally with a very unpleasant odor.

The uterus is much increased in size and the cervical canal is tense. The cervical canal may, however, be dilated and patulous, permitting the introduction of the finger. The tumor-masses may project from the os into the vagina, or with a patulous cervical canal the finger may recognize the soft growths in the uterine cavity. The tumor may be expelled into the vagina by uterine contractions, which may indeed invert the womb. Pieces of the mass can readily be broken off by the examining finger before sloughing has taken place.

There is a marked cachexia and rapid loss of flesh and strength, and finally death from peritonitis; pyemia, ileus, or metastasis takes place, ushered in by extreme anemia. The metastasis is more frequent in fibro-sarcoma than in the diffuse form, and occurs in the lymphatic glands, the lungs, the liver, and the pelvic cellular tissue.

In the *diffuse sarcomata* there is usually no distinct tumor to be recognized externally. The womb is enlarged and fixed. The growth may push itself through the os, giving the picture of a circumscribed tumor. This projection through the cervical canal is not due to expulsive efforts on the part of the womb, as in the fibro-sarcoma, and is not attended with labor-like pains, but is due to the rapid development of the neoplasm. Pieces of the mass readily break off, and are carried away by the discharges. Hemorrhage is seldom absent, and is usually violent. The menstrual type is soon lost, and as the disease usually occurs in the climacteric period or later, the hemorrhages excite alarm. The hemorrhage may be replaced, especially in the beginning of the disease, by



a continuous slight bloody discharge. Along with these profuse losses of blood is a rich watery or bloody-serous discharge, that is present before sloughing of the tumor-mass has taken place, and is usually of a disagreeable odor. Sloughing occurs early, and with it the discharge takes upon itself the peculiarities of the secretion from the gangrenous parts. The pain, very seldom absent, is often of great violence. It is of a tearing character, and depends for its intensity upon the depth to which the sarcomatous infiltration has penetrated. Death occurs, preceded by rapid debility and extension of the growth through the uterine walls to the neighboring organs and pelvic floor.

The certain **DIAGNOSIS** of sarcoma of the womb is arrived at only by the careful microscopical examination of its structure. The examination of small particles contained in the discharges is not sufficient to establish an absolute diagnosis. Either pieces of the extirpated growth or portions of the tissue removed deeply from the tumor by means of the sharp curette should be used. The presence of sarcoma must be suspected when a supposedly fibrous tumor is discovered in the climacteric period, or when a small supposedly fibrous tumor, formerly occasioning no symptoms, at this time or later begins to increase in size or to be attended with pain and hemorrhage. The occurrence of hemorrhage in supposed fibroma of the uterus, when menstruation has for a long time ceased, should always excite grave suspicion. The hemorrhage in fibromyomata ceases or lessens when the climacteric is passed. The copious bloody-serous discharge is a still more characteristic symptom, which, while not always present in fibro-sarcoma, never accompanies benign fibrous tumors except when sloughing has occurred. A further characteristic symptom of sarcoma is the abnormally rapid growth, especially if observed in the climacteric years, when fibromata do not usually increase in size. This is convincing when the growth is soft and accompanied by unusually violent pain. The softness of the growth on palpation, permitting the ready penetration of the finger into the tumor-mass, is, when sloughing fibroid is excluded, decisive for the diagnosis of sarcoma.

When to these symptoms are added an unproportionate loss of flesh and strength, cachexia, and anemia, the diagnosis is made with ease. The exact diagnosis should always be made after extirpation by microscopical examination.

The differential diagnosis between diffuse sarcoma and carcinoma

of the fundus is never easy and may be impossible. From carcinoma of the vaginal portion of the womb sarcoma may easily be recognized. In the latter disease the sarcomatous mass will be found projecting into the vagina through a healthy cervix, the margin of the os being recognized by the finger as a constricting band.

Much more difficult is the recognition of diffuse sarcoma from certain benign hypertrophies of the uterine mucous membrane, as endometritis fungosa. This affection seldom occurs after the climacteric, as is the case with diffuse sarcoma; the age of the patient is therefore of some help in establishing the differential diagnosis. The general condition of the patient is of great importance. In fungoid endometritis the patient may be anemic, but never becomes cachectic. The bloody-serous discharge is seldom present. The os is more or less patulous in diffuse sarcoma, admitting the finger. It is closed in endometritis. In sarcoma the uterus is large, and tender to pressure; in endometritis the size is not increased and there is no tenderness. The rapidly-proliferating sarcomatous growth frequently projects from the os, polyp-like, into the vagina; this never occurs in benign hyperplasias of the uterine mucosa. The benign hyperplasias always remain superficial growths, never involving the uterine substance. Sarcomatous growths belong usually to the deeper layers from the beginning, and infiltrate rapidly the uterine substance. The polypoid growths of fungoid endometritis sometimes grow again after removal, yet the return growths differ wholly from the residual growths of sarcoma.

The microscopical examination of the pieces found in the discharges often leads to error, as in sarcoma they may long consist of healthy tissue, and in simple hypertrophy, of granulation tissue resembling small round-cell sarcoma. Errors may be avoided by examining several pieces of the growth removed from different positions. It is safe to always assume that endometritis fungosa, so called, is in reality an early stage of beginning malignancy. Many patients have been allowed to progress so far as to be incurable under the supposition that the disease was benign. There is grave doubt whether such a thing as benign endometritis fungosa exists.

The PROGNOSIS in both forms of sarcoma is hopeless when a whole growth cannot be removed by operative measures. These growths may progress, slowly or quickly, to death. Compared with

the carcinomata, the prognosis for cure by complete removal is more favorable, as the lymphatic involvement is slower and the early recognition more probable.

The TREATMENT consists in total hysterectomy when the disease is recognized before involvement of the broad ligaments or of neighboring tissues has rendered the operation impracticable. Only when the removal is no longer possible should the treatment be symptomatic. In the abandoned cases the symptoms may be for a time controlled and the life of the patient prolonged by scraping away the diseased tissue with a sharp spoon and cauterizing the surface of the wound. The cauterization may be performed by the use of chromic-acid solution, fuming nitric acid, chloride-of-zinc solution,

FIG. 225.



Epithelioma of the Cervix Uteri, showing the well-defined limitation of the disease.

or, better, by the Paquelin thermo-cautery or by the galvano-cautery porcelain burner heated to a red heat. The further treatment is analogous to that of carcinoma—tonics and attention to the bowels, whilst opium must be given to relieve pain.

#### CANCER OF THE CERVIX.

Of all women who die from cancer, one-third die from cancer of the uterus. The disease is not so common in the negress as in her white sister. Uterine cancer occurs most frequently between

the ages of thirty and forty years and between fifty and sixty years. It has not been observed under seventeen years, one case being reported in a girl of that age. The frequency of its occurrence increases from thirty years to the menopause, after which it again decreases. Very many cases, however, have been observed after the climacteric period.

Only a small percentage of patients suffering from uterine cancer are nulliparæ. Deep laceration of the cervix with ectropion of the lips, if unheeded, is a possible predisposing cause of cervical cancer. It would appear that the constant irritation to which the raw, granular everted lips are subjected in locomotion and coition is the dangerous element. Long-standing cervical catarrh has also, perhaps, a causative influence. Finally, the cervix uteri, like most other ostia, as the lip, the pylorus, the cecum, and the rectum, is a favorite seat for cancer.

Heredity exerts a considerable influence in its causation. Among the higher classes of society carcinoma relatively seldom occurs, while among those of the lower grades, who are required to struggle for the necessities of life, cancer is observed with striking frequency. In this respect the occurrence of cancer is directly in contrast with that of uterine myoma.

*Epithelioma of the cervical mucous membrane* may grow from the squamous epithelium of the rete Malpighii, from the cylinder epithelium within the cervix, or from the glandular epithelial cells. Cancer of the uterine parenchyma has its origin in connective-tissue cells.

Cancer of the cervix may present itself either as a papillary or cauliflower growth, a nodular or parenchymatous growth, or a superficial or ulcerating disease of the mucous membrane.

The cauliflower or papillary form grows from the intravaginal portion of the cervix, and may be limited to it for a long time. It may develop so profusely as to hide the remaining healthy portion of the cervix and the os, appearing as a large papillary growth filling up the upper portion of the vagina. Finally, the growth spreads to the vaginal vault, which it deeply involves, all the tissues surrounding the uterus sharing in the infiltration. Extension may take place through the cervical canal to the endometrium by continuity of tissue, and the body of the womb may become involved.

The nodular or parenchymatous form of cervical cancer has its origin in one or more nodular formations in the cervical mucous

membrane. Usually they are situated just beneath the membrane, although they may be upon its surface. The nodules soon part with their covering of mucous membrane, and form ulcers which fuse together and, by extension, involve the fundus of the uterus and the vaginal cul-de-sac. The bladder, rectum, and pelvic cellular tissues may finally become invaded.

The superficial or ulcerative form begins as an infiltration of the mucous membrane of the cervix. The infiltrated area soon parts with its covering of mucous membrane and ulcerates. The ulcer progressively involves the deeper tissues, losing its necrotic surface as it advances, until finally the whole womb may be converted into a crater-like cancerous mass. By extension the peri-uterine tissues are invaded, while the vagina may be involved but little.

To the malignancy of the cervical carcinoma is added increased danger from the fact that the beginning, as a rule, is attended by no symptoms, and the disease is almost always discovered when it is too late for radical treatment. Only in the superficial or ulcerative form of cancer is the early stage attended with discharge and occasional hemorrhages. The other forms of cancer are attended with very slight discharge, and, other symptoms being absent, the case does not come to seek the advice of the gynecologist until the cancerous sore has already formed. This is attended with a more copious discharge and bleeding, which may occur periodically and be confounded with metrorrhagia from other causes. If the patient has not passed the menopause, the hemorrhages begin as increase in the normal menstruation, but later on occur between the periods. Frequently the first symptom noticed is hemorrhage following coitus. In the scirrhus form of the disease the bleeding may be absent, yet it very generally accompanies the disease, and it may be very alarming. The most extreme grade of anemia may result from the repeated hemorrhages, yet they very rarely are so copious as to produce death.

The first hemorrhage is usually followed by a sanious discharge, which may be slight and attract no more attention than the mucous discharges preceding it. The discharge may be purely serous and devoid of odor. As soon, however, as ulceration has taken place the discharges excite suspicion. Their color is at first dark from the admixture of fragments of gangrenous tissue, then grayish-yellow, green, brown, or black, and of a sickening smell. The pain at the beginning is slight or wholly wanting. Violent pain occurs when the infiltration has involved the pelvic connective tissue. As



a rule, the pain is proportionate in severity to the size and the hardness of the infiltrated area. The pain is most violent in slightly ulcerated carcinomata, or in those ulcerating late, when the hard, unyielding proliferations fill the entire pelvic cavity.

To the true pains of carcinoma, of a pricking, lancinating, or burning character, are soon added those of chronic peritonitis occasioned by the inflammatory adhesions which form as soon as the neoplasm has invaded the peritoneum. The cervical canal in its involvement may be so narrow as to retain the secretions of the uterine cavity. Attempts on the part of the uterus to expel this dammed-up secretion excite violent colicky pain. Complete closure of the cervix may occur and hematometra or pyometra result, but this is very rare.

The peculiar hardness of the abdominal wall is in a great measure occasioned by the pain, and is characteristic of the later stages of carcinoma. The muscular tissues are strongly stretched, the intestines elevated, and the pelvic walls give to the touch a peculiar sense of hard resistance.

The other symptoms are occasioned by the extension of the disease to the neighboring organs. Usually the growth extends to the anterior vaginal wall and involves the bladder. As a result of the infiltration of the submucous layers of the bladder-wall the mucous membrane becomes irritable, and there is pain on micturition with vesical tenesmus. It is seldom that there is retention of urine. As the growth advances the ureters become compressed or share in the involvement; their calibre is narrowed, and hydronephrosis may result. Soon the cancerous masses in the bladder-wall ulcerate; the tissues intervening between the bladder and vagina become progressively thinner, and finally are perforated. Frequently the rectum is also involved. Preceding the involvement of the rectum there are usually obstinate constipation and rectal catarrh from the pressure of the tumor obstructing its calibre. Following the rectal involvement is a progressive thinning of the recto-vaginal septum by ulceration and perforation, with the production of a recto-vaginal fistula.

The patient may remain in excellent general condition until the disease has attained extensive development. Carcinomatous disease frequently attacks large and strong women. The nutrition of the body then soon begins to fail on account of the continuous drain of blood and serum from the diseased cervix, of the accompanying



disturbances in the intestinal tract, and of the general degenerative effect of the cancerous disease on the blood. Usually there is obstinate constipation, although diarrhea may be present. There is a progressive loss of appetite, which may amount to an absolute disgust for food. Frequently there is vomiting, which may be the result of various causes. The stinking odor of the discharges is perhaps a decided element, and the uremic poisoning from pressure on the ureters has much to do with its production. The pain deprives the patient of sleep. Cachexia soon results from the frequent loss of blood and the profuse discharges. The legs become œdematous. At a later stage diarrhea sets in, and the patients lose flesh and strength rapidly. Fortunately for the patients, uremia, occurring from the slow occlusion of the ureters toward the close of the disease, clouds the intellect. They become more indifferent to their condition; the anxious expression is lost; the complaints of pain are less frequent; and they lie listless and dull upon their beds, without even attempting to change their positions. Gradually the cloud darkens, occasionally broken by a lucid interval, until death ends their pitiable existence.

In the majority of cases death takes place from uremic poisoning when the ailment is left to run its course and the patient is not carried off by intercurrent disease. The ureters are found thickened, often to the size of the finger, and the pelvis of the kidney greatly distended with urine. Purulent peritonitis may occur, and hasten the woman's end before the cancerous disease has involved the ureters. Exhaustion is of course a large element in the causation of death.

It is difficult to estimate the *COURSE* of the disease because the early stages are not recognized. As a rule, we may say that death occurs in from one year to one year and a half after the inception of the disease.

Carcinoma of the cervix is usually of easy *DIAGNOSIS*, from the fact that it is, as a rule, fully developed and often far advanced when it comes under observation. In the early stages of its development it is difficult of recognition. The cauliflower or papillary kind is the easiest to be recognized. Here the quick growth, the irregular, knotted, or cauliflower shape, and the rapid disintegration serve to make the diagnosis clear. As a rule, all sessile papillary or villous growths of the cervix are carcinomatous.

The parenchymatous or nodular form of cervical cancer is more

difficult of diagnosis. It is readily confounded with myoma if the nodules are situated in the patulous cervical canal or superficially, bulging the mucous membrane of the vaginal portion. A myoma, however, is of much harder consistency, and it is seated in normal tissue, while the softer carcinomatous nodules are surrounded by infiltrated and inflamed tissue. On incising the growth the myoma cuts with considerable resistance, while the carcinoma is soft like marrow. A positive diagnosis at times cannot be made until an excised nodule has been examined microscopically.

The differential diagnosis between superficial or ulcerating carcinoma of the mucous membrane of the cervical canal and long-standing cervical catarrh is arrived at with great difficulty. In the early stage of this form of carcinoma the appearance is the same in both conditions. The folds and markings of the catarrhal mucous membrane are perfectly preserved in cancer, though the submucous layers be involved, and the evidences of the malignancy only appear when ulceration has occurred.

Severe long-standing cervical catarrhs, with thickening of the vaginal portion and nodular enlargements of the surface, frequently excite suspicion of cancer. On close examination it will be found that the nodules consist of closed follicles filled with mucus and the surface is covered with epithelium. The absence of ulceration indicates the benign character of these cases of advanced hypertrophy of the cervix. Should the cervix be eroded, the diagnosis may be made by the character of the denuded surface. In cancer the margins of the ulcer are sharp and dentated, and the surface bleeds readily. The presence of numerous follicles, studding the entire cervix or the marginal zone of the ulcer, argues in favor of a benign character of the disease. In the digital examination of cases of long-standing cervical catarrh, the sensation of an irregularly degenerated, hard, carcinomatous growth may be imparted to the finger. On examination with the speculum, however, it will be noticed that the suspicious points are clothed with epithelium, and the absence of ulcers will clear the diagnosis. It is well to bear in mind that carcinomatous growths are easily broken up by the examining finger, while chronic inflammatory changes resist even strong pressure. A positive diagnosis should not be given, however, until a careful microscopical examination has been made of pieces of the growth removed for that purpose. Care should be taken that the tissue for examination should not be removed too superficially.

When ulceration has taken place the diagnosis is comparatively easy; but it must be remembered that carcinomatous nodules of the cervix may reach a considerable size before perforating the mucous membrane. On the other hand, large ulcerating myomata which are protruding from the cervix may so resemble carcinomatous growths as to excite grave suspicion. Diphtheritic inflammatory deposits upon the cervical portion and neighboring parts of the vagina may so closely resemble carcinoma, through the uniform swelling and ichorous discharge mixed with blood, as to make the diagnosis of carcinoma doubtful.

It is often difficult to determine how far carcinomatous infiltration has extended. The neoplasm often involves the pelvic connective tissue much deeper than it appears upon examination. The extension of the growth is best determined by combined examination through the rectum under ether narcosis. The mobility of the womb will also give valuable information on this point, for if that organ is firmly fixed the presumption is that the disease has invaded the peri-uterine tissues. By catching hold of the cervix with a tenaculum, and by dragging the womb down, much information can be obtained through the rectum as to the condition of the broad ligaments.

Unfortunately, the patients suffering with carcinoma of the cervix come under observation so late in its course that the total removal of the growth is usually rendered impracticable by the extensive involvement of the neighboring tissues. The condition of the patient is then most unfortunate. There is almost unbearable pain, insomnia, hemorrhage, progressive loss of flesh and strength, and foul odor from the discharges. This condition may long be protracted, or death from peritonitis or from some intercurrent disease may relieve the patient from her sufferings. The only favorable prognosis is afforded by the earliest possible operation, when the disease is yet limited to the cervix and the whole womb can be removed.

The TREATMENT of carcinoma of the cervix is either radical or palliative. The radical treatment comprises the extirpation of the whole womb with enough surrounding healthy tissue to ensure the complete removal.

As long as the disease is confined to the cervical tissue there are hopes of a radical cure, and, as has been stated, complete and thorough extirpation of the womb and all its appendages, together with as

much contiguous healthy tissue as is possible, is the only treatment to be considered. The method of removal is either the total abdominal hysterectomy or the combined operation as described elsewhere. Vaginal hysterectomy is not a proper operation for this disease, as by it sufficient healthy surrounding tissue cannot be removed with the same certainty or safety as by the other methods.

*Palliative Treatment.*—When the cancer has involved the vagina, or the wall of the bladder or of the rectum is infiltrated, or when there is found to be involvement of the broad ligaments, the inference is legitimate that the lymphatics have also become infected, and all radical treatment is contraindicated. Unfortunately, the radical treatment applies to a very small percentage of the cases met with both in private and in hospital practice. The onset of the disease is so insidious that early symptoms are overlooked, hemorrhages are referred to the “change of life” or to irregularities of menstruation, and the patients present themselves at last for advice with such extensive involvement that a brief respite from suffering and a short prolongation of their lives are all we can offer them. Our aim in these cases should be to check the wasting discharges and hemorrhages, and make the patients as comfortable as possible for the short time they have yet to live.

High amputation of the remaining cervix either by the knife or cautery will give remarkable temporary results. Patients will return home and for months remain free from hemorrhages, smelling discharges, and most frequently pain. So great will be the relief from suffering due to pain, anemia due to hemorrhage, and septicemia due to absorption of cancerous discharges that these women will often in a few months gain from twenty to fifty pounds of flesh. Ordinary simple or wedge-shaped amputation is impossible, as the disease has long since progressed far beyond the limits within which this operation is performed.

The method of high amputation was originated by Shroeder in 1878. His technique is as follows: The cervix is exposed by a perineal retractor and the labia held apart by assistants. The cervix is seized in the grasp of a double tenaculum or volsellum forceps and traction applied, the womb being drawn down as far as the elasticity of the uterine ligaments will permit. A circular incision is made from one-half to one centimeter beyond the margin of the diseased vaginal mucous membrane. There may be considerable hemorrhage from the divided vaginal arteries which

will require the application of hemostats and ligatures. After the hemorrhage has been controlled it is easy with the finger to separate the cervix from the tissues front and back, traction being made upon the cervix all the while. The connective tissue here contains no large vessels and is easily separated. The cervix is then drawn strongly to one side, rendering tense the parametric connective tissue on the opposite side, which contains the uterine vessels. This tense tissue, being easily recognized by the touch, is surrounded by a ligature, as in the operation for total extirpation. The manœuvre is best carried out by a half-blunt staphylorrhaphy or aneurysm needle. After tightly tying the ligature the included tissue is divided with scissors between the ligature and the cervix, and the ends of the ligature cut off short. This ligation should include the uterine artery. A ligature is similarly placed on the opposite side, and the tissues divided between it and the cervix. Frequently the tightly-stretched sacro-uterine ligaments interfere with the drawing down of the uterus. They may be included in a ligature and severed, when the uterus will readily descend. The ligatures should be applied as far from the cervix laterally as possible, so that the division of the tissues does not occur close to the cervix. The cervix is now transversely separated from the body of the uterus anteriorly as far as the cervical canal, and a stitch passed through the vaginal wall, the connective tissue, and the divided cervical wall, and brought out in the cervical canal. This, being tightly tied, provides the means for safely holding down the stump after complete separation of the cervix. Should there be any hemorrhage at this stage, it may be controlled by the application of several similar sutures. The posterior wall of the cervix is now cut through, and sutures passed as before around its circumference, uniting the mucous membrane of the vagina to that of the womb. As the upper end of the opened vaginal tube is much larger than that of the womb, the vaginal mucous membrane is thrown into folds by the sutures. On either side are openings in which the ligature strands lie; these require each a stitch to effect closure. If the ligatures include the uterine vessels and are tightly tied, there should be very little bleeding in this operation. The lower segment of the womb may be removed by this method if desired. Douglas's cul-de-sac is frequently opened; the author has opened it several times, but this misadventure did not increase the danger of the operation. The wound in Douglas's pouch should be imme-



diately closed by a continued suture of fine catgut. The vagina is to be carefully cleansed with boiled water and tamponed with iodoform gauze. The tampons are removed and renewed, and the vagina douched at intervals of twenty-four hours. In from five to eight days the tampons may be discontinued, but the daily douches are persisted in. On the tenth or twelfth day the patient may leave her bed. The early removal of the stitches is a matter of no importance, and the longer they remain the easier is their removal. Usually they are removed on the eighth day. If catgut be used throughout, there is no need of paying any attention to them whatever, as the loop is absorbed and the knot then falls off.

The steps of the operation are practically a combination of the first part in the vaginal hysterectomy with ligature and a simple amputation. A glance at the illustrations of these two procedures will render the steps clear.

The high amputation may also be performed by the *galvano-cautery knife*. The method is as follows: After exposing the cervix with a perineal retractor, and having the labia held apart by assistants, the cervix is seized by a double tenaculum or volsellum forceps and drawn down. The position of the bladder is determined by the introduction of a sound, and the site of the amputation carefully selected, so as to avoid wounding the bladder or opening Douglas's pouch. If it be found that the retro-uterine tissues are involved and that the peritoneal cavity must be opened to effect the excision, the operation should not be abandoned, for the results of such operations are said to be attended with little danger. In one such case, in which a hole was burnt into Douglas's pouch, no febrile movement whatever took place. The cervix should be amputated first, however, and afterward the retro-uterine tissues should be excised. A slightly curved cautery-knife electrode is applied cold to the point of election, the circuit closed, and a circular incision made, the cutting being finished without the removal of the knife. Should it be desirable to remove the knife in order that the direction of the incision be altered, the current should first be broken and the knife allowed to cool, in order to prevent hemorrhage.

After the circular incision has been made to the depth of about one-fourth of an inch the knife should be directed upward and inward, firm traction upon the cervix being kept up all the time. The remaining stump will be funnel-shaped, and should be gone



over again and again with a dome-shaped electrode to render the baking of the tissues more thorough.

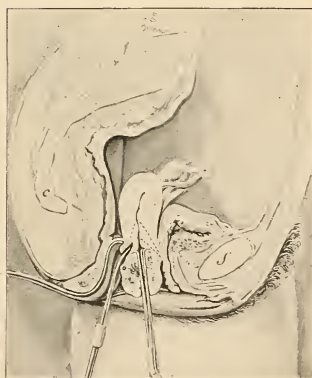
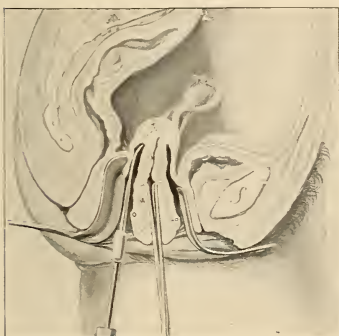
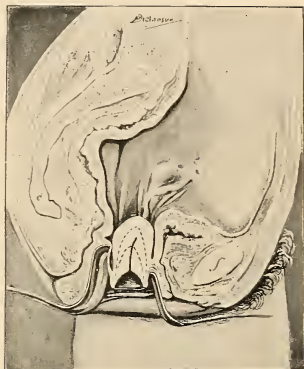
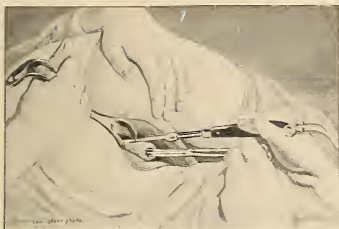
In cases requiring amputation above the internal os, the cervix should first be removed, the stump grasped on either side of the cervical canal, and the higher amputation proceeded with in the same manner as before. Thus it is possible by successive attempts to excise as high as is desired. The ragged edges are finally to be trimmed off by the cautery-knife and the cavity tamponed with iodoform gauze. The tampon is allowed to remain for forty-eight hours. The after-treatment consists in the use of antiseptic douches.

Almost as good results can be obtained by those not familiar with surgical procedures so formidable, by the use of the curette, scissors, and Paquelin cautery.

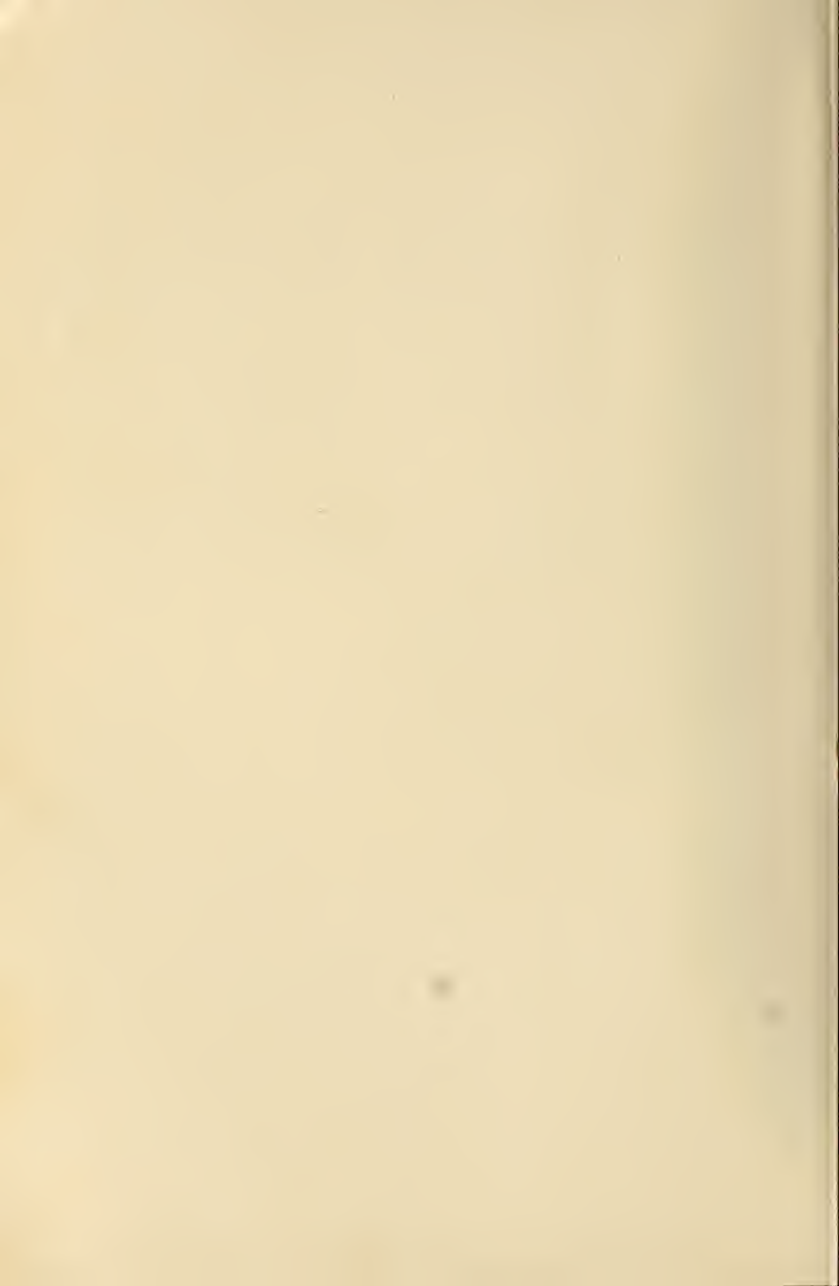
The ulcerating or vegetating cancerous masses may be rapidly broken up with the fingers and by scraping away with a sharp spoon curette. After quickly removing all the diseased tissue possible, the ragged edges are trimmed away with knife or scissors together with as much more of the disease as can be obtained. It is of importance to bear in mind the position of the bladder and rectum in cases of extensive involvement, as the infiltrated walls of these organs are readily perforated, thus rendering, by rectal or vesical incontinence, the condition of the patient more uncomfortable than before interference. After sponging the cavity dry, the raw surface is seared with the button-shaped end of the Paquelin cautery heated to a dull cherry-red heat, and the wound tamponed with iodoform gauze. The cauterization is repeated again and again, the aim being to char the tissues left behind as deeply as possible. This tissue subsequently comes away by slough. The dressing should be renewed in forty-eight hours, and the vagina douched with bichloride-of-mercury solution 1:4000. After such treatment the gain in weight and strength is fully as much and as rapid as after high amputation: it has the advantage of being a much less formidable operation. The improvement lasts usually from three to six months. In a few cases we have known the respite to last for several years.

The use of caustics applied on small tampons to the raw surface after curetting, or independent of this operation has been advised. Nitric acid, chromic acid, 5 per cent. solution of bromine, caustic potash, and saturated solution of chloride of zinc are the caustics usually employed. After their application the vagina should be pro-

PLATE XVIII.



Removal of Carcinoma of the Uterus by the use of the Galvano-cautery after the method of Byrue.



tected by tampons wet in a saturated solution of sodium bicarbonate. In forty-eight hours the tampons are to be removed, and the parts dressed with iodoform gauze until the slough of the cauterized area separates. This usually takes place in from seven to ten days. The use of the Paquelin cautery seems, however, to meet every indication and to be attended with less discomfort to the patient.

When the disease returns, as it surely will, or originally, should for any reason the surgical procedure be refused or deemed inadvisable, an effort must be made to relieve the symptoms as far as possible with drugs. The success, however, is not very encouraging, and the nearer the end approaches the greater are the sufferings and the more horrible the condition.

The fetid discharges are best relieved by douches of permanganate-of-potash solution, 3 to 6 drachms to the quart, of peroxide-of-hydrogen and chloral solutions, or of suppositories of chloral and tannic acid, which on account of their irritant action must be used intermittently with the douches. Thymol solutions have also been recommended.

For the hemorrhages, which are seldom fatal, yet always weakening and alarming, it is best to use douches of very hot water or of very hot vinegar. If these fail, the vagina may be tamponed with pledgets of cotton wet in a saturated solution of alum. Should this fail to control the bleeding, some cotton, which has been soaked in Monsel's solution and dried, may be placed upon the cervix and secured by a gauze tampon. The use of Monsel's solution is seldom required, and should never be resorted to if it is possible to control the bleeding by other means. It produces dense coagula which are liable to occasion fresh hemorrhage in their subsequent removal, or, if allowed to stay, undergo decomposition and add to the patient's suffering.

To prevent erythematous eruptions from the discharges, the external genitals should frequently be cleansed with castile soap and warm water, washed with lead-water, and anointed with borated vaseline.

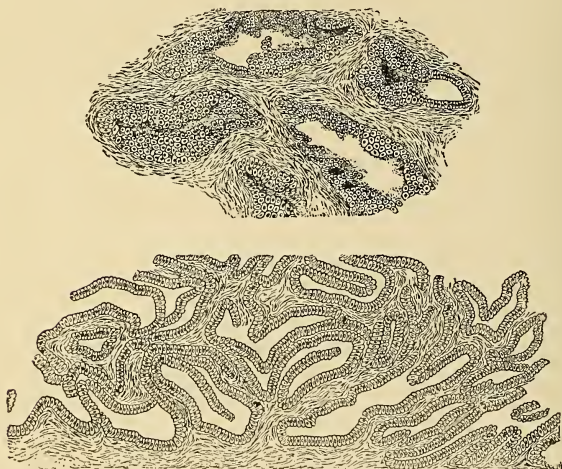
The patients, beside local treatment, require tonics and easily-digested food. The bowels are prone to become constipated, and require special care. The pain, though modified by local treatment, is distressing and demands the use of morphia. The withholding of opium from these sufferers is cruel in the extreme, and either the administration of some form of the drug by the mouth or the

hypodermic use of morphia in whatever quantities required, is demanded in every case. They have but a few months to live; let these months be as comfortable as possible.

#### CARCINOMA OF THE BODY OF THE UTERUS.

Carcinoma of the body of the uterus is less frequent than that of the cervix, and a more frequent condition than sarcoma. It is more a disease of advanced age than cervical carcinoma, and is not usually seen before the menopause. It may occur in nulliparous women, and is then usually found in sterile women who have passed the climacteric and in old maids.

FIG. 226.



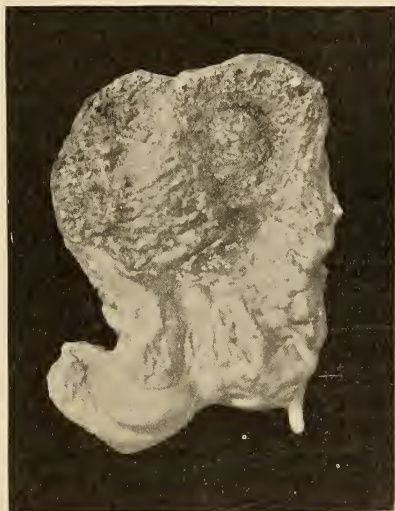
Malignant Adenoma of the Uterine Mucous Membrane, beginning glandular epithelioma.

The disease originates in the glandular element of the uterine mucous membrane, and may present itself as a polypoid degeneration of the endometrium or as a diffuse infiltration. It rapidly invades the deeper tissues, which become necrotic and are thrown off. From the rapid destruction of the uterine tissue the womb soon becomes converted into a crater-shaped carcinomatous mass. Adhesions form to the contiguous organs, and perforation may take place into the bladder and intestine or into the peritoneal cavity,

thus causing rapidly fatal peritonitis. The disease extends into the tubes and involves the ovaries. Metastatic nodules in other more remote organs are frequent.

**SYMPTOMS.**—The first symptom is hemorrhage. Later on there follows a copious watery discharge which may be purulent and offensive. The discharge may be bloody-serous in character and destitute of odor, and both hemorrhage and discharge may be wanting. The secretions are more fetid when softened carcinomatous nodules become loose in the uterine cavity and are expelled from it with

FIG. 227.



Carcinoma of the Body of the Uterus.

bearing-down pains. The pain differs widely as a symptom. In many cases it is wholly wanting. The pains of carcinoma of the uterine body are similar to those accompanying other uterine tumors. Lumbar and sacral pains are complained of, and frequently violent pains in one or both lower extremities. Paroxysms of pain, recurring at certain hours of the day, are characteristic of carcinoma when present, but do not always accompany the disease. They resemble the pains of uterine colic, and are occasioned by the



abnormal contents of the womb. Attempts of the womb to expel its contents occasion especially tormenting pain. Later, when the growth involves the serous covering, peritonitic pains are added.

On examination the uterus will be found uniformly enlarged. Later in the course of the disease metastatic nodules may be recognized as prominences upon its surface, or adhesions to neighboring organs render it no longer capable of being definitely outlined. The enlargement is usually not extensive, and in the earlier stages it is barely recognizable. The cervix is occasionally patulous, or is at times dilatable by the examining finger, permitting the growth to be felt in the uterine cavity and pieces to be removed. It may be hollowed out by the invasion of the disease, forming with the uterus a large cavity.

The general health usually fails late in the course of the disease. Often extensive disease is found in well-nourished women. Three times has the author successfully removed the whole womb for this disease in women who were fat, ruddy, and the pictures of perfect health. In none of these cases was pain the prominent symptom, but repeated and very persistent dribblings of blood. In one case only was the hemorrhage even alarming.

The *DIAGNOSIS* of cancer of the body of the uterus often presents many difficulties. Where the uterus is regularly enlarged and there are no bad-smelling discharges, the case may easily be regarded as myoma, yet the attention will be attracted in many cases to the strikingly tense distension of the uterine walls occasioned by the rapidly-growing neoplasm. This condition recalls that of hematometra.

When a uterus, at first regularly enlarged, develops upon its surface one or more knob-like projections and forms adhesions to the neighboring organs, the indications are clearly of malignant growth. The diagnosis will be made then, however, too late for radical operation.

The whole clinical course of cancer of the uterus should excite suspicion. The return of irregular hemorrhages after menstruation has ceased, often for years, should arouse the suspicion of cancer if there are no polypi in the endometrium or cancer of the cervix to account for it. The eventual occurrence of bad-smelling discharges and the perceptible increase in the size of the womb will confirm the suspicion. On the introduction of the sound the irregularly degenerated surface of the growth may be felt, and frequently the

sound, used without force, will penetrate the masses, and, indeed, perforate the womb, as happened once in our hands. These clinical symptoms in advanced cases are so clearly indicative of cancer that hardly a doubt should remain as to the diagnosis.

Microscopical examination of excised pieces should always be made. The pieces are removed at different positions of the growth with a sharp spoon. The operation is attended with neither suffering nor harm to the patient, and renders the diagnosis more certain before the corroborative symptoms of the later stages have developed, which place the patient beyond the pale of operative interference.

Cancer of the womb, from a curative point of view, must be regarded in its incipient stage, before it has progressed to fixation. In the course of its advance the lymph-glands which lie behind the peritoneum of the posterior abdominal wall, and the lymphatics at the point of attachment of the ligamentum latum upon the abdominal parietes, are the first to become affected. The palpation of these glands is extremely difficult, if not impossible. So in cancer of the uterine body it can never be determined absolutely whether the radical operation will be attended with a return of the disease or not. It can be decided only that the performance of the operation is feasible. For this reason the prognosis in cancer of the body is perhaps less favorable than in that of the cervix. Yet, on the other hand, cancer of the body of the womb is slower in attacking peri-uterine structures.

The sole TREATMENT for cancer of the womb, wherever situated, whether in the neck or the body of the womb, before infiltration of the adjoining tissues has taken place, consists in the complete removal of that organ with its ovaries and tubes by the abdominal incision or by a combined vaginal and abdominal incision. The vaginal operation is totally inadequate in the face of this disease.

In uterine cancer, if the vagina is not implicated, if the disease has not travelled along into the broad ligaments, and if the womb has not been fixed by adhesions, the immediate and remote success attending the operation of the complete removal is an extremely satisfactory one, considering the character of the disease. The averages of immediate and permanent recovery compete most successfully with those of the excision of the breast for cancer.

As regards permanent success, cancer of the breast is discovered earlier, and is therefore operated on earlier, while cancer of the womb is often not discovered until it has so far advanced as to have

insidiously implicated contiguous and continuous structures. Even when it is discovered, being seated in an unseen organ, its dangers are not realized and operative interference is liable to be postponed. Hence one would infer a larger measure of permanent success in extirpation of a mammary cancer. Yet, from our own personal experience, and from a careful statistical inquiry into the experience of others, we are thoroughly convinced that the removal of the womb for cancer far surpasses, in its remote or permanent success, not only all other operations for cancer of the womb, but also all operations for cancer in other parts of the body. Nor need we wonder at this success, because the lip, breast, penis, and rectum, which are the favorite sites for cancer, are integral parts and parcels of the body, while the womb is to the body only an appendage, which is merely suspended by stays and guys, and these of a different or mongrel tissue.

We all know how liable cancer is to return in the breast even when discovered early and the whole mammary gland has been removed. Cancer of the lip or of the penis behaves no better, while cancer of the rectum almost always returns, no matter how early or how thorough has been the extirpation of the gut. On the other hand, a careful study of the work in the hands of the principal gynecologists of the world shows a permanent recovery—after three or four years—ranging from 45 to 70 per cent. In view of these facts we are warranted—indeed, we are compelled by duty—to operate whenever we can do so safely in a case of cancer of the womb, and that by the complete extirpation of the whole womb. Every other operation aiming at the removal of only the diseased portion of the womb is a delusion and a snare.

#### CANCER OF THE OVARY.

Carcinoma of the ovary is usually secondary to a carcinoma of the womb or of some other organ. Primary ovarian cancer may occur, however, and appears to have no relation with the age of the individual. It has been observed before puberty. Usually both ovaries are involved.

Primary ovarian carcinoma appears in two forms—as a diffuse cancerous infiltration of the ovarian stroma, or as a tumor growing from the periphery of the organ.

In the first form the ovary is usually uniformly converted into a cancerous mass, preserving its form, although it may reach an enor-

mous size. Ovarian cancers of this class have been observed as large as a man's head. Rarely, several cancerous masses may form

FIG. 228.

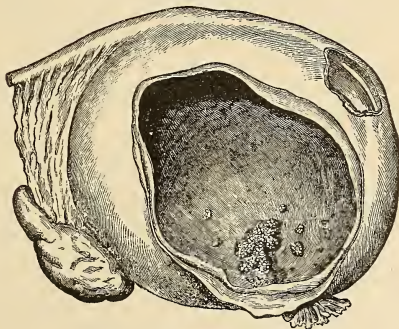


Section of an Ovary, showing its surface covered with papillomata.

in the ovarian tissue, which, growing rapidly, give rise to an irregularly shaped tumor.

In the second form of ovarian carcinoma the growth forms a cauliflower-shaped mass which projects from the surface of the

FIG. 229.



Papillomatous Cystic Tumor of the Ovary.

ovary. It consists of a papillary proliferation rich in blood-vessels and covered with cylinder epithelium. This form of carcinoma of the ovary leads early to ascites and to the infection of the peritoneum.

Of much more frequent occurrence is the cancerous degeneration of cystomata of the ovary. These appear either as the epitheliomatous form, having its origin in the papillary proliferation of a cystoma, rapidly leading to infection of the peritoneum and to

ascites, or as a pure glandular type of carcinoma forming in the tissue of the ovarian cystoma.

The ovarian carcinoma soon excites profuse ascites and chronic peritonitis from its irritation of the peritoneum. It spreads rapidly by circumscribed nodular formation to the neighboring organs, and through the broad ligament to the pelvic connective tissue. It may

FIG. 230.



Papillomatous Disease of the Broad Ligaments, completely hiding the appendages.

perforate the covering tissues of the ovary, and proliferate, fungus-like, in the cavity of the pelvis. The epitheliomata infect the peritoneum much earlier.

The primary symptoms do not differ from those of benign enlargements of the ovary. The tumor grows, however, more rapidly. Symptoms of chronic peritonitis exist. A symptom of much diagnostic importance is the early œdema of the feet and ankles from pressure upon the great vessels of the pelvis. The condition of the patient continues to grow worse until death occurs from peritonitis, marasmus, stricture of the bowel, or from uremia.

The marked distension of the abdomen from ascitic fluid usually first causes the patient to seek advice. Soft, compressible masses in Douglas's pouch may then be felt. It is usually necessary to draw off the ascitic fluid by a small median incision or by tapping in order to make an absolutely certain diagnosis. The relaxed abdominal walls then permit an easy examination of the pelvic organs, and the irregularly-enlarged ovary or cauliflower-growth may be



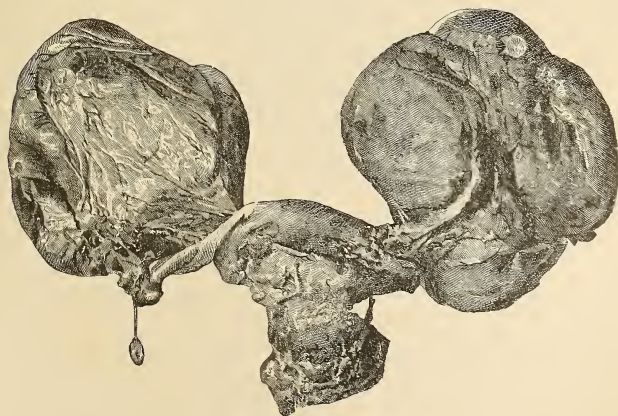
clearly detected, if the process has not progressed so far as to involve the entire pelvis and render the ovary a highly probable point of origin. An important point in the differentiation between this and a benign ovarian tumor lies in the progressive and steady loss of flesh and strength. This, together with the ascites and the rapidity of the growth, generally renders the diagnosis almost certain. Pain is not a prominent symptom of this disease.

The TREATMENT instituted depends upon whether secondary involvement of the peritoneum has taken place. If this has not occurred, ovariectomy should be performed at once. Frequently, after opening the abdomen, the operator will find, to his disappointment, the impossibility of complete removal. If the infiltrated base of the growth is to be felt extending into the pelvic cellular tissue, or nodules are found in Douglas's cul-de-sac, the operation should be abandoned, as attempts at removal of the growth would only hasten the end.

#### SARCOMA OF THE OVARY.

Sarcoma of the ovary is of rare occurrence. It is usually of the spindle-cell variety and affects both ovaries. It has been observed

FIG. 231.



Sarcoma of both Ovaries.

in girls eight years of age. The growth develops from connective tissue of the ovarian stroma, which normally contains short spindle-



shaped cells. Sarcomatous tissue is frequently found in dermoid cysts, and growths resembling sarcoma microscopically often follow their removal. The spindle-cell ovarian sarcoma is attended with considerable vascular development, which gives the growth a cavernous appearance. The Graafian follicles may become dropsical, and, increasing rapidly in size, produce a cystic complication of the sarcoma.

The sarcomatous tumor preserves the shape of the ovary, and may reach a considerable size. Tumors of this kind have been reported weighing eighty pounds.

The **DIAGNOSIS** is difficult. A large solid ovarian tumor is easily recognized. Such a growth is probably sarcomatous if of rapid growth, possessing a smooth surface, and attended with ascites, especially if the patient be young and both ovaries be tumefied. Progressive loss of strength and flesh, with or without pain, is of great significance.

There are practically but two solid tumors of the ovary, fibroid and malignant; fibroid growths of the ovary are exceedingly rare. The presumption in the case of a solid tumor of this organ is therefore in favor of malignancy.

The **TREATMENT** is wholly surgical. Sarcomata of the ovary do not rapidly involve the neighboring tissues, nor do they give rise to early metastasis. After removal they are not so prone to return as the carcinomata. Still, one is not sure of complete cure by extirpation even in the most favorably appearing cases. The author has had perfect cures from the removal of the cyst; then, again, he has seen the disease return very soon; but in one case it did not return for five years, during which time the woman enjoyed good health.

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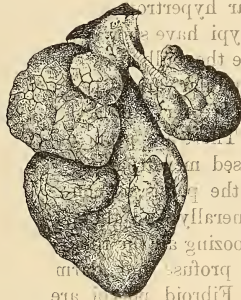
## BENIGN UTERINE NEOPLASMS.

### FIBROID POLYPI.

*Cervical.*—These are always more or less pedunculated, generally with slender stems. True fibroid polypi arising from the cervix are not common. More generally is it the case that cervical polypi are of glandular origin.

As in the illustration, the gross appearances of the growths where they contain much fibrous tissue, strongly resemble malig-

FIG. 232



Small Muriform Polyp of the Cervix (papillary fibroma with glandular hypertrophy).

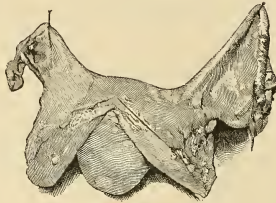
nant disease, and the diagnosis may rest entirely on the microscopic appearances.

Cervical polypi, being exposed to the vaginal filth, usually produce a nasty, purulent discharge, profuse and ill-smelling. There is always more or less general glandular endocervicitis with them, the cervix being as a rule widely gaping and eroded. They do not reach a large size. If the pedicle be long and the mass hang entirely outside the cervix, strangulation may occur in the growth and a spontaneous cure ensue.

*Uterine.*—These are merely transitional between the mucous polypi already described and submucous fibroids. They are de-

scribed by many authors as the result of the uterine contractions forcing the submucous fibroids into a pedunculated form—an attempt at spontaneous cure. The uterus being in a condition

FIG. 233.



Intra-uterine Fibroid Polyp.

of chronic metritis is always more or less enlarged, and its cavity is distended. Purulent endometritis is a common accompaniment, and general glandular hypertrophy is usually present.

Some of these polypi have short stems, but their pedicles may be so long as to cause the bulb of the polypus to hang from the vulva. Unlike the glandular variety, fibroid polypi are usually single.

**SYMPTOMS.**—These are very similar to those occasioned by small, submucous fibroids. There are pronounced uterine cramps, purulent discharge, increased menstruation, hemorrhage, backache, and a sense of weight in the pelvis, as common symptoms. The discharge is profuse generally, and the bleeding is marked. There may be a continuous oozing all the time, or the bleeding may occur as hemorrhages, very profuse and alarming. The cervix uteri is generally patulous. Fibroid polypi are not easily mistaken for other growths when once seen and felt.

**TREATMENT.**—Fibroid polypi are not amenable to medical treatment. Pedunculated fibroid polypi from the cervix may readily be removed by torsion. Should the base be firm or broad, it may be severed with the scalpel and a few sutures taken to correct the hemorrhage and approximate the cut surfaces.

Small polypi from the body of the uterus may also be removed by torsion, but it is better to combine with this curettage and gauze packing if the general endometrium be, as it usually is, much hypertrophied.

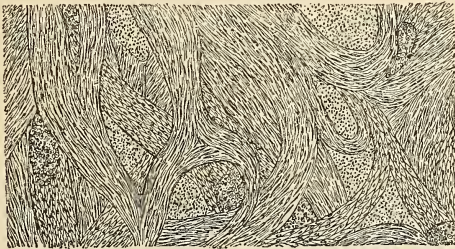
Large polypi are occasionally quite formidable affairs. In case the finger cannot be introduced into the vagina at all, owing to the

size of the growth, it is proper to cut away enough tumor to enable the passage of the finger and stout forceps. The pedicle is sought for and secured by forceps, when the growth is to be cut away. The pedicle may be twisted or sutured. As these growths are unclean, irrigation and gauze dressings are indicated. It must not be forgotten that in old women malignant disease is apt to supervene upon any long-standing inflammatory condition of the inside of the uterus. Therefore it is always well to submit the curettings and the polypus to the microscopist for examination.

### UTERINE FIBROIDS.

**PATHOLOGY.**—Uterine fibroids are composed of an increased growth in the fibrous and muscular structures of the organ; they

FIG. 234.

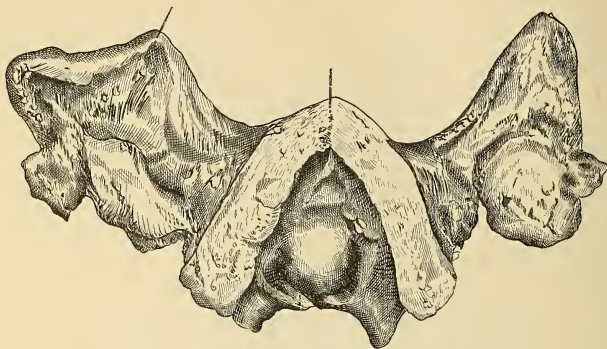


Uterine Fibro-myoma, microscopic view.

are generally, then, fibro-myomata. They are non-malignant tumors, but not infrequently is malignant disease associated with existing fibroid. They may occur just beneath the uterine mucous membrane, or deeper in its walls, or immediately under the peritoneum. They are then known as submucous, interstitial, or subserous. They are prone to occur in nests or groups, and the several varieties are very often associated; precise classification in such a case is not possible. In gross appearances these tumors are of a deep red color or pale. They are firm, and under the knife cut like gristle when the fibrous tissue predominates, but are less firm when the muscular fibres are in excess. Upon section the striations of bundles of fibre may be seen, and nests of fibrous tissue bulge from the cut surfaces as nodules. Their walls may

contain cysts filled with clear, bloody, or purulent fluid. They are prone to undergo various degenerative processes—cystic, myxo-

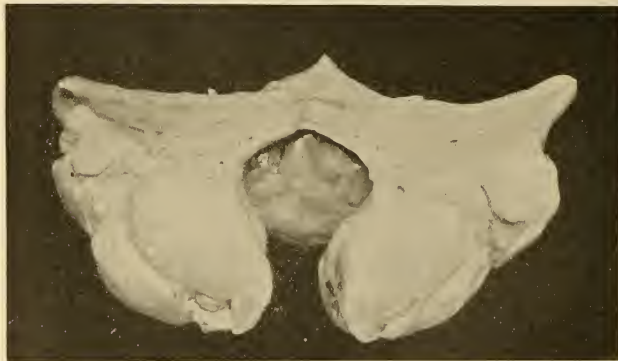
FIG. 235.



Submucous Uterine Fibroma.

matous, fatty, and even calcareous degeneration. There are two forms of cystic degeneration—one due to myxomatous changes;

FIG. 236.



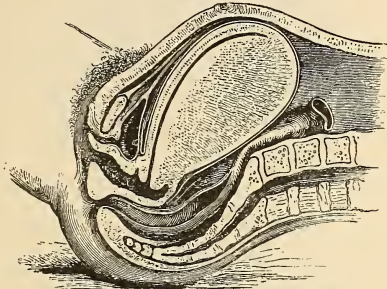
Submucous Fibroid Tumor of the Uterus: the uterus is laid open, showing the fibroid cut in two; also cavity of the uterus.

the other, more common, due to lymphangiectasis—distension of the intermuscular lymph-spaces.



Fibroid and fibro-cystic tumors occur of any size, from that of a pea to the largest, weighing one hundred and ninety-five pounds,

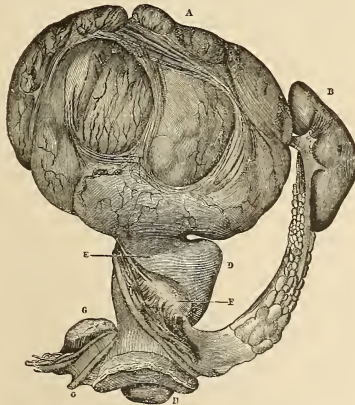
FIG. 237.



Large Fibrous Interstitial Tumor of the Uterus.

removed by Severanu. They arise from any part of the body of the uterus, and less frequently also from below the os internum. Large

FIG. 238.



*A*, Subperitoneal Pedunculated Fibroid; *B*, left kidney; *C*, Wolfian cyst; *D*, interstitial fibroid contained in the right cornu of the uterus; *E*, insertion of the pedicle of the large tumor on a level with the left cornu; *F*, left ovary and round ligament; *G*, right ovary and round ligament; *H*, cervix.

subserous tumors are covered with enormous veins, and all fibroids are generously supplied with blood. According to size and locality,



FIG. 239.

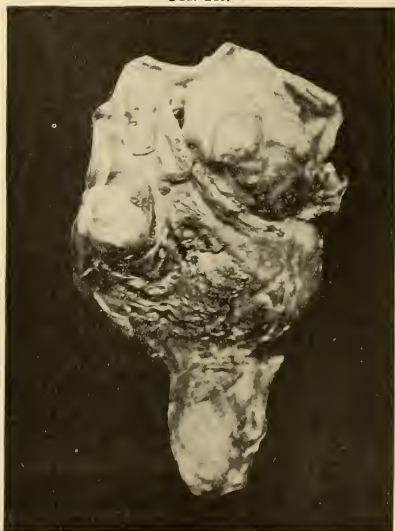


Interstitial Fibroid.

they may form attachments to almost any of the abdominal organs. Pedunculated fibroids from torsion of the pedicle, may slough.

In addition to the above degenerative changes, fibroids may

FIG. 240.

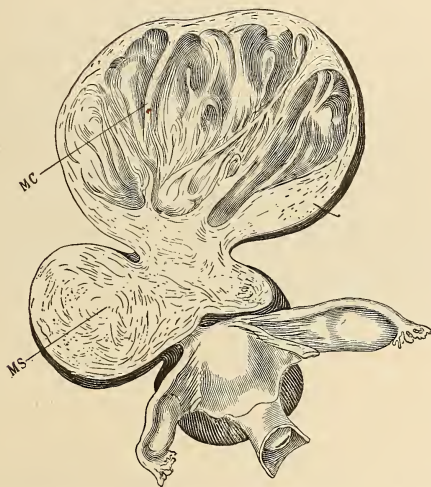


Calcareous Degeneration of Fibroma, showing the calcareous nodules.

become infected and undergo inflammation, with the production of pus, or even become gangrenous. Finally, the mucosa of the fibroid uterus may become epitheliomatous, or the connective tissue may be infiltrated with sarcomatous elements; and it is not uncommon to find cancer of the cervix coexisting with fibroid of the body. The cell-proliferation arises from the adventitia of the arteries, and the tendency to it is probably congenital.

Wyder has shown that there is nearly always an endometritis of a glandular, hypertrophic character, associated with fibroid.

FIG. 241.



Pedunculated Fibroid with Abdominal Evolution : MS, fibroid lobe ; MC, fibro-cystic lobe.

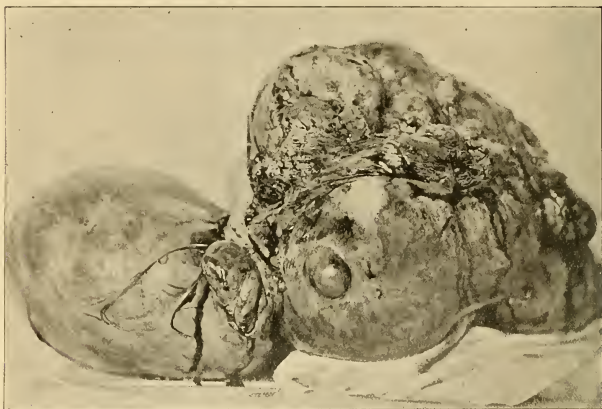
The Fallopian tubes are the seat of interstitial change also, and may contain bloody or purulent fluid, and the ovaries are usually enlarged, with thickened capsules.

Various interstitial changes are produced in the important viscera, chiefly by obstruction to the vascular circulation, as fatty liver and nephritis. Large tumors are also associated with conservative hypertrophy of the left heart. There are two forms of heart degeneration, which are supposed to exist in advanced cases, and

known as brown and fatty degeneration. Fibroids occur before middle life as a rule, and have even been noticed before puberty.

More or less peritonitis is to be found in connection with the large tumors, binding them to the viscera. The omentum especially is prone to become attached to them, thus lending to the growths a new and increased blood-supply. Large blister-like accumulations of serum often occur just under the peritoneum

FIG. 242.



Enlarged Blood-vessels on the Surface of a Multinodular Subserous Fibroid Tumor of Uterus.

adjacent to the sides of the large tumors, and more or less ascites accompanies them.

**SYMPTOMS.**—Some fibroids, even of considerable size, give rise to no symptoms at all for some time, the patient merely noticing increase in her girth. Symptoms are due to the situation rather than to the size of the tumor. Subserous tumors give rise to pressure-symptoms chiefly, while hemorrhage is the most marked symptom of the submucous and interstitial varieties. But one subject may present all the various forms.

**Pain.**—This is very marked where the tumor causes a general distension of the uterine walls. Like all uterine pains, it is productive of hysterical symptoms. There are other pains, paroxysmal and from contraction of the uterine muscle, due to the irritating presence of the tumor. Local pain is less commonly attendant

upon the subserous variety. The greater the tension in the uterine walls, the more severe is the pain. Thus it frequently happens that there is less pain where the growth has become large and thus escaped from the control of the uterine muscle.

Tumors of size growing from any part of the uterus cause pain from pressure on the nerves and adjacent organs. These pains radiate down the thighs and through the bladder and bowels from obstructed function in those viscera. Pressure-pains are most marked with tumors which are yet in the true pelvis. When the uterus and neoplasm have risen above the brim of the pelvis, they have a greater range of mobility. Menstruation and other bleedings increase the pains markedly in some cases.

*Hemorrhage.*—The menstruation first begins to be increased in amount. After a while the flow is extended in time for a few days, and an observing patient will appreciate that she is using more napkins at each successive period. Soon intermenstrual bleedings occur, and at such irregular intervals that the patient will lose all record of menstruation. She will be free from hemorrhage for weeks, and then have a bleeding which will bring her to death's door. This hemorrhage is produced from the hypertrophied endometrium, which often is in a condition of general polypoid degeneration, but there may be profuse bleeding from a membrane which is atrophic. Vessels which in the normal endometrium are mere capillaries become here thin-walled arterioles. These bleedings are often the first symptoms of mural and submucous fibroids, even of those of small size. Subserous growths may attain considerable size before giving rise to marked bleeding. The occurrence of the menopause has a favorable effect upon these growths, but it often never occurs, and is always postponed by the tumor. Again, most tumors begin to produce marked symptoms at a time when the menopause should naturally occur. Moreover, the menopause may merely check the bleeding for a time, it recurring after a few years.

Alternating with the hemorrhages is a leucorrhœa. This may be a simple whitish discharge, or sanious or purulent according to the changes in the endometrium. It is frequently chylous, profuse, and particularly exhausting to the patient.

*Pressure-symptoms.*—Tumors lying in the true pelvis obstruct the rectum, thereby producing retention of feces even for many days at a time, and inducing a form of systemic poisoning by the re-absorption of excreta—"retention toxicosis." Also, as a result

of this pressure, hemorrhoids are of common occurrence. The action of the bladder is interfered with by pressure on the urethra, producing thereby painful and difficult urination, with, ultimately, cystitis from retention.

The presence of large fibroids so obstructs the return flow of blood from the legs that there is necessarily a compensating enlargement of the veins of the abdomen. The ureters may be so obstructed as to produce hydronephrosis, and ultimately interstitial change in these glands, with albuminuria. Dropsy of the legs may occur from pressure alone, independently of kidney change.

*General Symptoms.*—As a result of the repeated hemorrhages these patients are exsanguinated to a considerable degree. In some the bleedings are sudden and fierce. These suffer from attacks of syncope. In others there is a continuous dribble, with occasional floodings, and they present the worst appearance of all, inasmuch as there is no interval during which recuperation may occur. Many of them are in very good flesh, some even fat. But those who have large tumors are emaciated from locking up of the emunctories and loss of appetite.

In large tumors producing pressure on the intestines there are the symptoms of anorexia, costiveness, foul breath, headache, and sometimes vomiting. Even in cases where there is no suppuration in the tumor, there may be rise in temperature; but, as a rule, febrile manifestations are indicative of degenerative changes, with production of septic material either in tumor or viscera.

Death from fibroid occurs either from asthenia, due to the continuous loss of blood and pressure, or some complication, and even from sudden profuse hemorrhage.

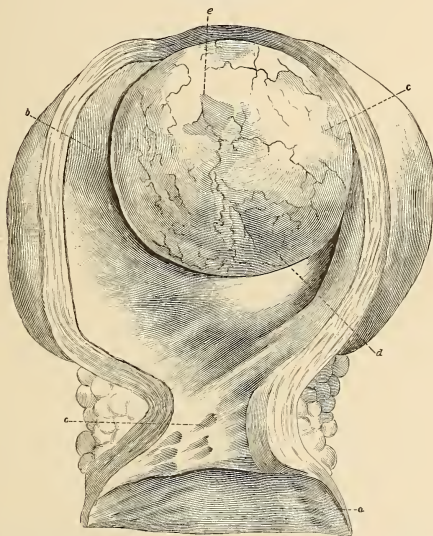
*DIAGNOSIS.*—A. *Submucous Fibro-myoma.*—The hemorrhages are especially severe, and first attract the patient's attention. Irregular uterine colic is also frequent. If the tumor is large enough to fill the pelvis, all the symptoms due to pressure are present.

Examination is most satisfactory. The uterine canal is increased in depth. Rectal and abdominal palpation show the organ to be enlarged in all its diameters, and reveal its shape. Intra-uterine palpation is perfectly safe, and may be performed by one of two methods. That of Vulliet, by packing the uterine cavity each day with successively increasing pledgets of iodoform gauze, is efficacious, free from danger, but painful and slow. Failing to dilate the cervix sufficiently for intra-uterine examination by Vulliet's method,



incision of the cervix and forcible dilatation are to be employed. Dilatation being of sufficient extent, the finger of one hand is introduced into the uterus, while the other supports the fundus above. The submucous fibroid will be found to have made for itself a depression on that wall opposite its origin, and the tumor will be felt as a smooth, rounded body. The examination finished, the uterus is irrigated and a light drain of gauze introduced. If it has

FIG. 243.



Edematous Submucous Fibroid: *a*, portion of the vagina; *b*, cavity of the uterus; *c*, tumor lodged in the cavity of the uterus, covered by mucous membrane (*d*); *e*, tumor rising above the surface of the cavity.

been determined to remove the tumor by enucleation at a subsequent day, or if there be too free hemorrhage, the uterus should be tightly packed with iodoform gauze. In this way the cervix will be kept open for future treatment. These submucous myomata are sessile, and never pedunculated.

*B. Interstitial Fibro-myoma.*—Frequently a small tumor is accompanied by a general fibroid enlargement of the uterus, giving rise to the most severe symptoms, and yet the nodule projects into neither uterine nor pelvic cavity. The diagnosis here is difficult,



and with the enlarged uterus the symptoms point equally to carcinoma; therefore a curettage for diagnostic purposes is proper, as it enables the microscope to differentiate absolutely between the hypertrophic endometritis of myoma and the cell-proliferation of cancer. The shades of difference between aggravated hypertrophic endometritis with enlargement of the muscularis as a sequence, and general hypertrophy of the muscular walls, with a small interstitial myoma and thickened bleeding endometrium as sequences, are very slight. The chief point in distinction is the exact amount of uterine enlargement. Bimanual examination under narcosis, aided by the microscopical investigation of pieces removed by the curette, should determine the question. At least it may enable us to eliminate cancerous and tubal disease.

Where the interstitial fibroids are large, increased depth of the uterine cavity, general enlargement of the uterus, and more or less irregularity in its contour, either exterior or on the mucous coat, will suffice to make the diagnosis plain. These tumors when large produce hemorrhage, expulsion pains, and hysterical manifestations, in addition to pressure-symptoms.

*C. Subserous Fibro-myoma.*—These tumors are usually multinodular, and present a great diversity in arrangement. They may be sessile or pedunculated. The sessile tumors must be considered according to whether they extend between the layers of a broad ligament, into the bladder or into the pelvic cavity.

The diagnosis of sessile subserous fibroids projecting free into the peritoneal cavity is easy, the nodule being readily felt upon bimanual examination and rectal touch. At the same time, other conditions are easily excluded.

If the sessile fibroid grows from the anterior surface of the uterus and displaces the bladder, the uterus is usually retroflexed. The finger in the rectum may be made to feel the division between the uterus and fibroid, or the hand above the pubes may. But not always is this sulcus present, and the entire history and surroundings must be critically considered in order that an accurate diagnosis may be made.

Intra-ligamentous fibroids are exceedingly puzzling. They simulate ovarian cysts, broad ligament disease, extra-uterine pregnancy, and tubal cysts. Those which project into the broad ligament from the side are not especially difficult of diagnosis. They are more firm than other tumors in this locality, and the depression above and

below between tumor and uterus may be felt. There is not the tenderness which accompanies tubal disease, and there is more mobility when the nodule is small. Ovarian tumor, for many reasons, may be excluded. Extra-uterine pregnancy which has lasted a few months, especially if preceded by menorrhagia, is not easily differentiated from fibroid, for it has the same tense walls as fibroid. Although there is severe pain, yet it is not as lancinating as that of extra-uterine gestation, and is not followed by collapse, as in the latter. The pains of fibroid come on gradually, whereas the extra-uterine pregnancy first attracts attention by the sudden onset of the stabbing pain from the first attempt at tubal abortion. There is great difficulty in making the diagnosis sometimes, so similar are the histories of the two conditions. All fluid accumulations fluctuate, and are thus excluded.

When the sessile intra-ligamentous tumor grows down against the floor of the pelvis, it exercises violent and painful pressure upon the structures passing under it. The uterus is lifted up and immovable. The tumor is not only sessile, but also attached to the pelvic floor. Here rectal touch is especially valuable. The cervix is often so drawn upon for tissue as to be a mere ending to the vagina and cul-de-sac. So firmly attached to the pelvis are these growths that they seem to spring from the pelvic fascia. Enchondromata and fibromata of the pelvic floor have none of the general symptoms which intra-ligamentous tumors produce, and may thus be rejected.

Dermoid cysts under examination may suggest fibroid, but the subjective symptoms of the two conditions will suffice to differentiate.

Pedunculated subserous tumors float free in the abdomen with long pedicles, or are joined to the uterus by a shorter and more firm bond.

Oedematous tumors simulate ovarian cysts, but the fluctuating portions of the fibroid are limited, and there are parts of the tumor which demonstrate its character. The diagnosis is often utterly impossible. Unless the pedicle be very long and slender, the cervix grasped with the volsella and drawn down communicates at once its motion to the tumor; with dermoids and other hard cysts it does not. The area of displacement of fibroid is below the pelvic brim, that of floating kidney above. Splenic tumors arise from the splenic area and may be traced to their origin. Cancerous and

tubercular omental disease displaces the stomach downward, and there is no area of resonance save at the hypogastrium. The growth is more rapid than in fibroids, and hemorrhage is wanting.

Many large fibroid and fibro-cystic tumors never give rise to hemorrhages, and the first and sole symptom may be the presence of the tumor. This is especially true of the fibro-cystic tumors, they causing, compared with the true fibro-myoma, but little bleeding. They have taken some time to grow, and coils of intestine are commonly in front of them, giving a tympanitic percussion-note. Almost invariably the cavity of the uterus is increased in depth, and rectal touch at least will demonstrate the attachment of the tumor to the uterus.

**TREATMENT.**—Sometimes tumors are accidentally discovered, produce no symptoms, and never give rise to conditions requiring treatment. They remain innocent during all the woman's life.

The treatment may be divided into non-operative and operative. In the former class we shall mention but two methods of treating these growths—by the use of ergot and by electricity.

*Ergot Treatment.*—The ergot is used both hypodermically and by the mouth, and is employed in every form of the tumor—in subserous fibroid for the purpose of causing shrinking, and in interstitial and submucous growths not only to cause diminution in size, but also, possibly, to cause expulsion of the growth *per vias naturales*.

Squibbs's aqueous extract (ergotin), dissolved 1 part to 10 of water, and 1 grain of salicylic acid added to each half-ounce of solution, the whole sterilized, may be employed with a hypodermic syringe kept for that purpose. The syringe also should be carefully sterilized before each application.

Beginning with 1 grain a day, the dosage may gradually be increased, the uterine pain governing largely the amount used. The same preparation may be used in pill form associated with nuxvomica or strychnia. Where the tumor is submucous and interstitial large doses of ergot produce sudden and severe uterine colic; not so much impression is made, however, upon pedunculated fibroids. The depressing action of ergot upon the heart should not be forgotten, and for that reason it is wise to use strychnia at the same time. It is better to use a moderate dose continuously with weekly increases than to give enormous doses and intermit.

Thus, if a patient receives internally 3 grains of ergotin a day and 1 grain hypodermically one day in the week, she should take enough to cause marked effect upon the uterine muscle.

There can be no question as to the effect of the drug. The most careful observers are unanimous in testifying that it not only relieves symptoms, but in all cases reduces the tumor, and a number of cases are reported of the voiding of tumors under its use. There is but little danger in its use, and we have been able to find only two cases which died while undergoing this treatment. Hydrastis canadensis is also highly spoken of as a substitute for ergot, in doses of 20 minims of the fluid extract, three times a day.

Ergot has no effect upon the fluid contents of fibro-cysts.

*Electricity.*—The electrical treatment of fibroids is so technical, and requires such an assortment of instruments and batteries, that information on the manner of using it will be left to special works on the subject. Different authors give different instructions as to the strength of the current: they range from 15 milliampères to 250, or even more. The pain produced by the strong currents is excessive. As to the results of the procedure, the latest figures are given from the works of Keith, Englemann, Gautier, and others who are particularly skilled in the method. There were 372 cases: 9 cured, 5 died. This is 2.4 + per cent. cured and 1.3 + per cent. died — too high a ratio of mortality and too low a ratio of cures. The percentage of cures about represents the possible percentage of errors in diagnosis. There is another certain percentage not mentioned here, but which is, under careful investigation, growing. We refer to malignant disease associated with fibro-myoma. Electricity is admittedly not applicable to any form of cystic fibroma.

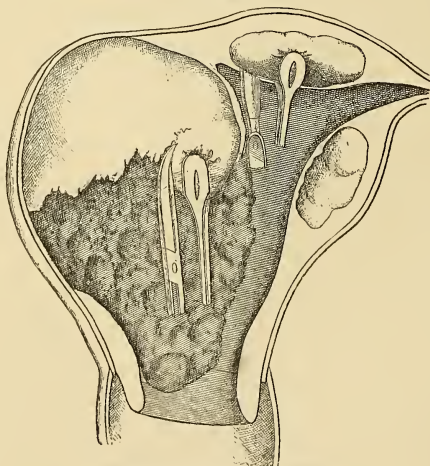
Altogether, the method must be considered purely experimental. The above results are certainly not flattering. Surely better results have been obtained from the use of ergot, and infinitely better from the removal of the uterine appendages, with about the same rate of mortality. In all cases where the physician feels he would not care to attack these growths radically, in view of the poor results at the hands of those who are masters of the electrical method, we would certainly recommend the use of ergot or hydrastis to the exclusion of electricity, supplemented also by curettage in cases with severe hemorrhage, the results on both the tumor and general economy being excellent.

The treatment of fibroids by galvano-puncture is no longer

practised to any extent, and is to be condemned in an uncompromising manner.

*Surgical Treatment.—Vaginal Enucleation.*—This operation may be applicable to tumors which may pass the pelvic outlet or those not larger than the fetal head. The method is limited to growths which are strictly submucous or covered by only a small quantity of muscular tissue. The cervix is to be dilated by daily packing with gauze, and at the time of operation its calibre may be still more increased by incisions and forcible dilatation. The operation is preferably done in the dorsal position. The patient should be prepared as for a hysterectomy. If there be not room enough, the uterine artery may easily be ligated (see Vaginal Hysterectomy), and the cervix split to the vaginal junction. The tumor being located, its capsule is seized with a bullet forceps and split with a scalpel from above downward. A blunt-pointed curved scissors is then used to loosen the capsule from the circumference of the tumor. The excess of capsule is then cut off with scissors. The tumor is now

FIG. 244.



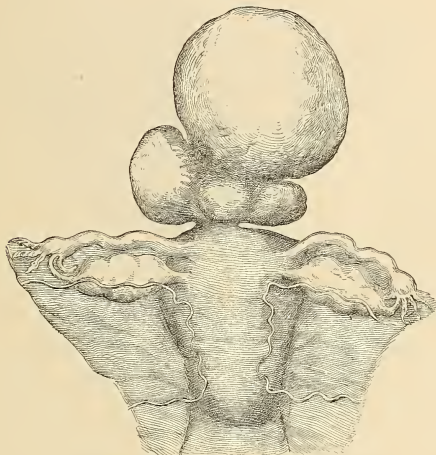
Removal of Fibroma by Morecellation.

seized with the forceps, and attempts made to dig it out of its bed with the blunt scissors, the point being turned toward the tumor.



In this way, alternately snipping connecting fibres and using either the closed scissors or an enucleator, but all the time applying firm traction on the tumor, it may be loosened from its bed, with the exception of a few fibres. It is then seized with a pair of strong forceps or hysterectomy volsella and twisted off. If the mass will not pass the cervix, it may be split. All loose shreds of tissue and capsule

FIG. 245.



Subperitoneal Nodular Fibroid Tumor of the Uterus.

should be cut away, the finger introduced to see how much damage has been done, and the uterus washed out and packed with iodoform gauze. The hemorrhage is best controlled by the packing. The great danger from this operation has heretofore been sepsis, a thing we can now avoid. Even perforation of the uterus is not especially dangerous. Many tumors now removed by hysterectomy were formerly dealt with by this procedure. The after-treatment consists of the administration hypodermically of ergotin, frequent irrigation, and gauze packing invariably instead of drainage tubing. Most tumors formerly subjected to this operation are now preferably extirpated from above.

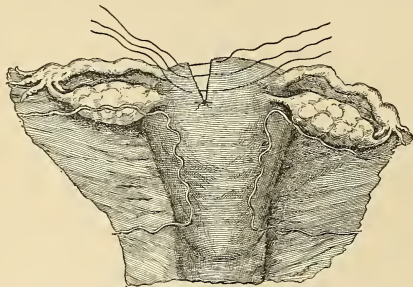
Applicable to tumors of the submucous and interstitial variety, *morcellation* will never occupy a place in surgery. It essentially involves incomplete piecemeal removal of the growths by forceps,



scissors, and knife, after severe preliminary incisions in cervix and uterus.

Small interstitial fibroids may be removed by total vaginal hysterectomy. The operation may be indicated when the mass is very

FIG. 246.



Method of Removal of a Subserous Uterine Fibroid, stitches in place ready for tying.

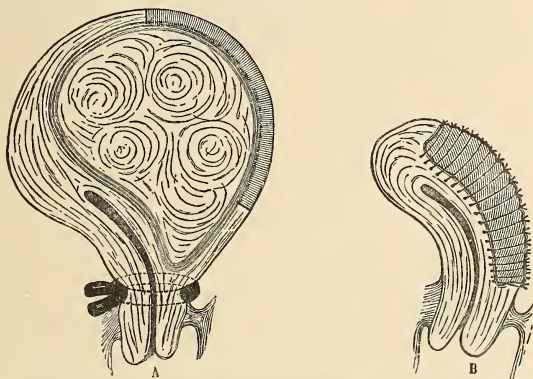
small, gives great pain, which produces profuse bleeding, or is septic. Cœliotomy is, however, preferable, as a general rule.

*Myomectomy.*—It will occasionally happen that the fibroid is attached to the uterus by a pedicle so small as to warrant removal of the tumor through the abdominal incision, with the saving of the uterus. The pedicle is subjected to a V-shaped incision and the tumor removed. Sutures of heavy silkworm-gut or silk are then used to unite accurately the sides of the pedicle. If there is complete control of the bleeding without the appearance of strangulation by the sutures, the uterus is returned and the abdomen closed. Large pedunculated fibroids with stout pedicles may be treated differently, thus eliminating the great danger of myomectomy—hemorrhage. An elastic ligature or *écraseur* is thrown around the pedicle a little distance from the uterus, and the tumor cut away. The pedicle is brought up into the wound, transfixed with stout pedicle needles, and the wound accurately closed around the stump, thus treating the stump extra-peritoneally. (See Supra-vaginal Hysterectomy.)

The procedure may also be applicable to small (single or multiple) interstitial fibromata. The objections to myomectomy are, that uterine fibroids are almost universally multiple, and, no difference how many nodules are removed, the chances are largely that others have

been unobserved and left behind to reproduce the trouble. In the vast majority of even small interstitial fibromata the complete enucleation of the tumors is a matter of great difficulty and results in much traumatism. The causes which in the past have rendered hysterectomy

FIG. 247.



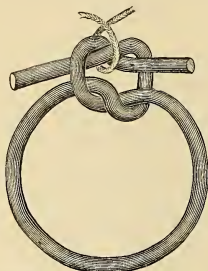
A, Enucleation of an Interstitial Myoma: B, Disposition of Sutures after Enucleation.

tomy so fatal are present in myomectomy—*i. e.* the great difficulty, almost impossibility, of placing stitches in uterine tissue with any degree of security.

*Supra-vaginal Hysterectomy. — Extra-peritoneal Amputation Method.*—This necessitates the treatment of the stump extra-peritoneally. The abdomen is opened and the uterus and tumor are turned out through the incision. If necessary to accomplish this, the broad ligaments are ligated between two ligatures and a rubber ligature drawn taut, or an *écraseur* is applied around the neck of the uterus. In fastening the rubber ligature one knot is tied and a stout silk thread is thrown over it; then the second knot in the rubber ligature is tied, and the silk thread tied over this second knot. The same may be accomplished by grasping the knot in the bite of a pair of hemostatic forceps. Thus slipping is prevented. If the *écraseur* is used, it is carefully tightened. The peritoneum two or three inches above the constricting wire is incised completely around the tumor, the broad ligaments being by this means allowed to retract. The tumor is then drawn further up out of the incision, thus forming a smaller and better pedicle. Transfixion pins are made to per-

forate the pedicle immediately above the wire, and the tumor is cut away about an inch above the pins. The stump is held high in the

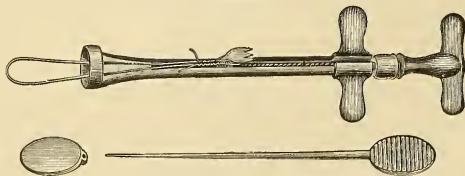
FIG. 248.



Knot of Rubber Ligature secured from Slipping by Application of Silk Ligature.

lower angle of the wound, and inspection made of the constricting wire to see that it does not include the bladder or ureters in its grasp. If in proper position, it may be allowed to remain permanently, but if not satisfactory, it is loosened and applied at a higher level; the transfixion pins are shifted to a higher point at the same time. Should the stump be too large, it must be reduced to a size

FIG. 249.



Serre-nœud for Hysterectomy.

not greater than an inch or two in diameter by cutting the muscular and fibrous portions away piecemeal, the wire being carefully tightened during the procedure. The peritoneum is then closed by stitching it to the serous surface of the pedicle below the wire, by means of a single silk or catgut suture. The peritoneum of the pedicle is closed by drawing it up over the stump by means of a continuous whipped silk suture. Throughout the whole procedure the *écraseur* is continually tightened by turning the screw. Unless this precaution be observed the tissue of the stump shrinks under the

PLATE XIX.

FIG. 1.

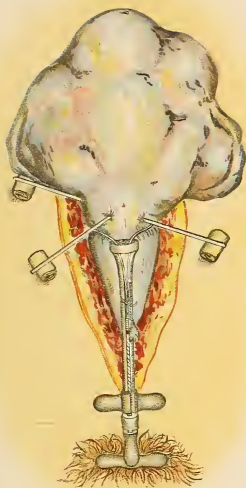


FIG. 2.

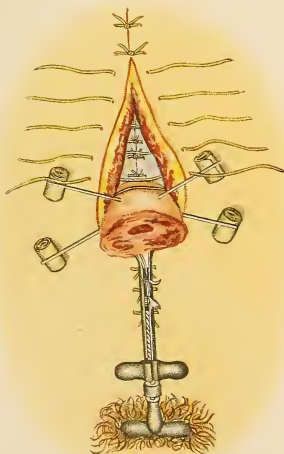
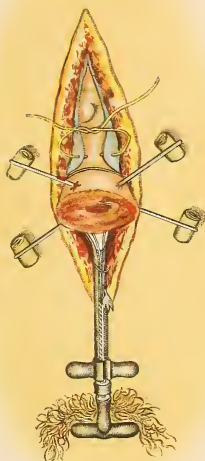


FIG. 3.

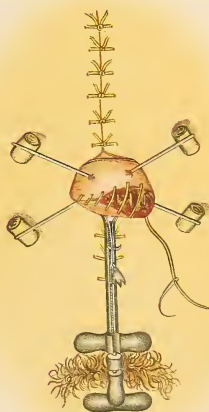


FIG. 4.

EXTRA-PERITONEAL TREATMENT OF THE STUMP AFTER SUPRA-VAGINAL HYSTERECTOMY.

- FIG. 1.—Transfixion pins and serre-needle in place prior to removal of tumor.  
 FIG. 2.—Abdominal peritoneum stitched to peritoneum of stump below wire.  
 FIG. 3.—Peritoneum closed; abdominal stitches in place.  
 FIG. 4.—Abdominal wound closed; stump in process of closure.



pressure of the wire, and bleeding would soon occur. If the rubber ligature be used, this precaution need not be observed. The abdominal walls are closed in the usual way by interrupted silkworm-gut sutures, passing through all the tissues but the serosa. After the stump and surroundings have been thoroughly dried an iodoform gauze dressing is applied. Pads of gauze are slipped between the transfixion pins and the skin, and are also packed carefully about and over the stump, iodoform having been freely dusted over and rubbed into the stump. The whole is covered with a thick gauze pad and held in place by a three-tailed abdominal binder. This operation can be performed very rapidly, and may be applicable to all tumors with the exception of those which burrow between the broad ligament folds, and septic tumors, where the sepsis involves the neck or pedicle. The pedicle dries up and gradually melts off into the dressings or comes away as a solid mummified mass. The first dressing is made on the eighth day, when the stitches are removed, the *écraseur* having been kept tight by turning the key several times daily. The stump is ready to come off in from two to three weeks. If it does not come away itself in that time, it is best to remove the wire and pins and cut it away.

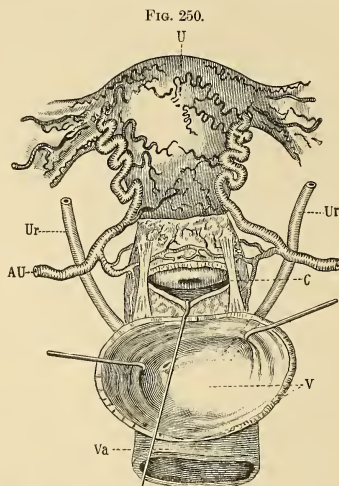
The stump sinks deeply into the pelvis, leaving a tube of granulating tissue, which is packed with gauze and which gradually closes. The question of drainage must be settled by the necessities of each individual case. As a rule, it is unnecessary.

There is, of course, a break in the parietes at the position of the pedicle which may subsequently form a hernia; these patients should wear an abdominal pad, and should be kept in bed not less than six weeks or two months after the operation. Occasionally also a fistulous opening may remain from the cervical canal to the incision, through which air may pass up and down on exertion; this is, however, of rare occurrence, the greater danger being that of hernia.

*Intra-abdominal Amputation Method.*—The patient is placed in Trendelenberg's position, the abdomen opened, and the tumor delivered if possible. If this cannot be accomplished, the first steps of the operation are carried out with the tumor *in situ*. A single ligature is passed through the broad ligament near the pelvic wall and tied, not being passed deep enough to include the uterine arteries. Another ligature is made to transfix the broad ligament near the uterus, and tied. The tissue between these two ligatures is cut through, and the same procedure is repeated on the opposite side. In this ma-



neuvre the uterus is freed from its attachments to the pelvic wall, and the two ends of the ovarian vessels are safely included in the ligatures. The knife is now run lightly around the tumor just above the peritoneal reflexion of the bladder in front and a little lower behind, and the peritoneum stripped down, thus forming two flaps. The uterine arteries are next ligated as they pass between the cervix and the ureter, the ligature being passed close to the cervix, in order to avoid any possibility of including the ureter in its grasp. The



Relation of the Ureters and Uterine Arteries to the Cervix: *U*, uterus; *Ur*, ureter; *AU*, uterine artery; *C*, cervix uteri, displayed by a transverse incision of the anterior vaginal cul-de-sac; *V*, section of the bladder at the level of the entrance of the ureters through its walls; *Va*, vagina; two bands of fibrous tissue are seen to unite it laterally with the uterus. We can distinguish in the cervix the part not covered by peritoneum which adhered to the bladder before dissection.

ligature may be passed between the flaps of peritoneum thus formed or outside of them. One is placed on each uterine artery and is securely fastened. This is the most important step in the operation. The tumor is now amputated on a level with the ligatures on the uterine arteries by a V-shaped incision, the point of the V being carried well below the point of ligation. (See Plate XX.) The cervical canal is charred with a Paquelin cautery or disinfected with a bichloride-of-mercury solution, in order to avoid any chance of septic infection from that source

PLATE XX.

FIG. 1.

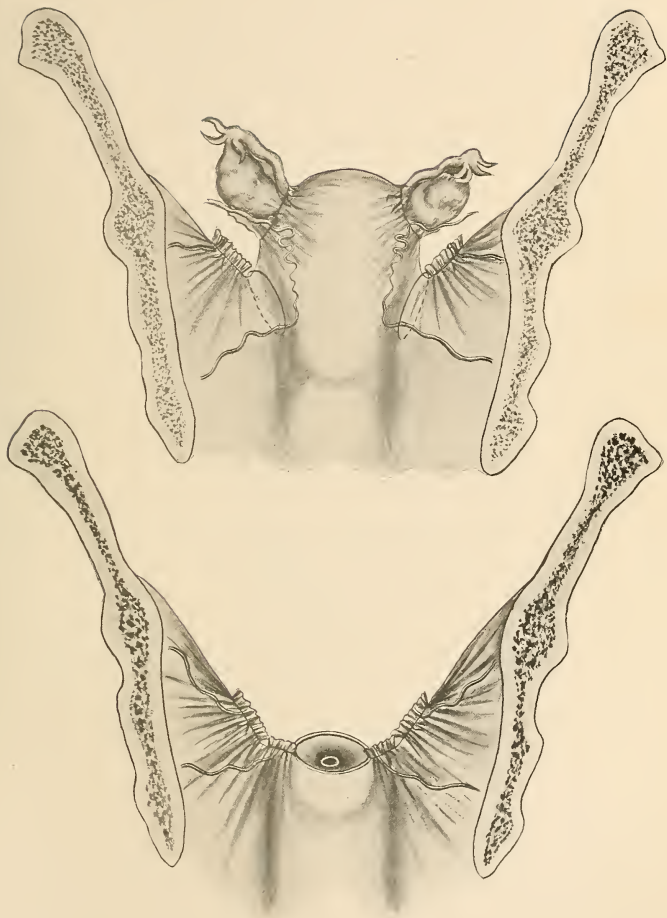


FIG. 2.

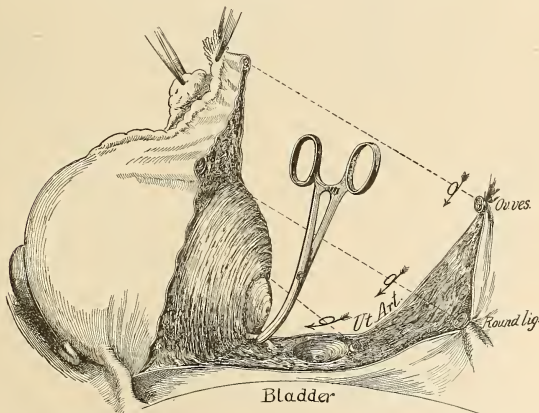
FIG. 1.—Supra-vaginal Amputation of the Uterus: first step. Position of second ligature shown.  
FIG. 2.—Supra-vaginal Amputation of the Uterus: cervix amputated by wedge-shaped incision.



during the subsequent manipulations. The cervical flaps thus formed are now brought together with a continuous suture, which, after closing the cervix, is carried along, whipping the cut edges of peritoneum together from one side of the pelvis to the other. (See Plate XXI.) By this procedure the cervix, the two ligatures on the uterine arteries, and at times even the ligatures on the ovarian arteries, are turned under the peritoneum, thus becoming extra-peritoneal. The abdomen is closed without drainage.

In *intraligamentous fibroid tumors* or bad (chronic) pelvic inflammatory conditions a modification of this procedure is at times invaluable. The modification is, however, accompanied by such technical dangers and difficulties that as a routine practice—excepting in the hands of an expert—it is not to be employed. It should never in the inflammatory cases be the method of choice, but always that of necessity.

FIG. 251.



Left ovarian vessels tied, vesical peritoneum divided and pushed down, and left uterine vessels ligated. Cervix amputated and uterus pulled up and out, exposing right uterine artery, which is clamped an inch above the cervical stump. The two following steps are clamping the right round ligament and right ovarian vessels, when the mass is removed.

The operation (see Fig. 251) is begun as above by tying off the ovarian artery on the free side of the uterus, cutting through the broad ligament down to the uterine artery on the same side, and ligating it as before. The ligated uterine artery is now severed, and by drawing the uterus forcibly to the opposite side it is amputated at its neck. The bladder is freed from the uterus in the usual manner.

Immediately on amputating the uterus the opposite uterine artery comes into view and is grasped with a pair of forceps. This artery is at once severed, and by continued strong traction on the uterus the broad ligament on this side is torn through in an upward direction until the ovarian artery is reached. This artery, together with the round ligament, is caught with forceps, and the remainder of the broad ligament cut through. Ligatures at once replace the forceps, and the operation is completed as in the ordinary procedure. The danger in the operation lies in a failure to find the vessels and grasp them in forceps, and in severing the ureter. An expert will know how to avoid these dangers. The ordinary surgeon will succumb to them not infrequently. In intraligamentary neoplasms and in pelvic inflammatory conditions in which the adhesions are so universal as to make the line of division between the sigmoid and rectum and the diseased masses too uncertain to venture on breaking up the mass, or are so dense as to necessitate the use of too great force, this procedure will be found to render apparently hopeless cases comparatively easy.

There are three elements in the intra-abdominal amputation operation worthy of note: its bloodlessness without elastic temporary ligation, absence of raw surfaces from dissecting off the bladder, and avoidance of ligatures about the cervix, which tissue is free from the possibility of sloughing. It has all the advantages, then, and none of the drawbacks, which attach to all other methods of treating the pedicle intra-abdominally. We believe it to be the ideal operation of its kind. This procedure may be employed in any and every condition in which it is desirable to remove the uterus, except in the presence of malignancy or tuberculosis of the uterus.

When considering the intraperitoneal operation, and in view of the ease with which the vagina may be rendered sterile, the question naturally suggests itself, "Why not go a little farther and remove the cervix too?"

*Total Abdominal Hysterectomy.*—The patient is to be prepared as for both a vaginal hysterectomy and cœliotomy. Here, again, as many times before, stress is laid upon the importance of thoroughly cleansing the vagina and the difficulty in doing so by the usual methods. Trendelenberg's posture occupies to this operation what Sims's does to vesico-vaginal fistula: it renders the operation not only possible, but comparatively easy. But two instruments need be mentioned as supplementary to the ordinary ovariectomy set: blunt and sharp Deschamp's needles for ligating *en masse*.

PLATE XXI.

FIG. 3.

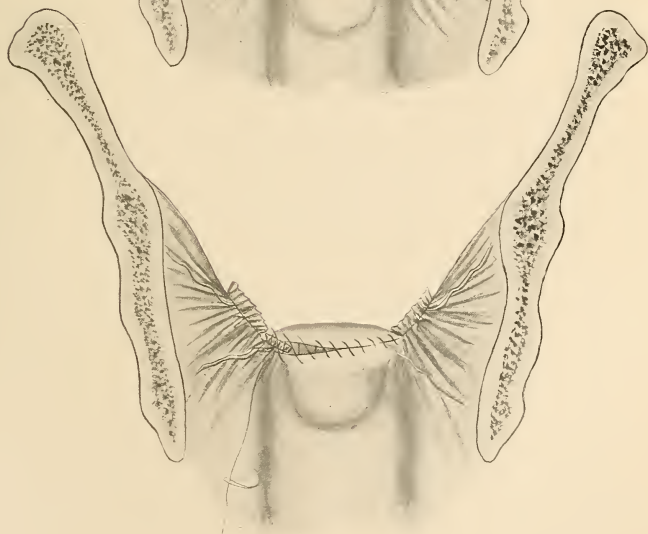


FIG. 4.

FIG. 3.—Supra-vaginal Amputation of the Uterus: cervical canal being closed by sutures which are buried by subsequent sutures.

FIG. 4.—Supra-vaginal Amputation of the Uterus: peritoneal edges of the stump in process of being whipped together, the lower stump being buried under the peritoneum.

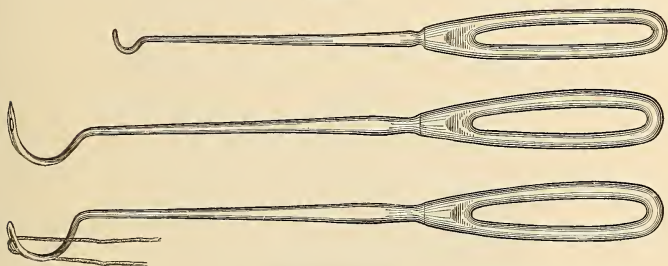




The objective points are the two ovarian and two uterine arteries, for these furnish the main blood-supply of the uterus and tumor.

The operation which will be described may be applicable to all cases of fibroid tumor, intraligamentous as well as others, and to all other diseased states of the uterus and adnexa where it is desired to ablate the uterus together with the adnexa through the abdomen. The typical operation will first be described and then its modifications.

FIG. 252.



Deschamp's Needles.

**OPERATION.**—The uterus is curetted and irrigated, but not packed. If the cul-de-sac is readily accessible, it may be opened through the vagina and a wad of iodoform gauze inserted into the opening. The patient is placed upon a Trendelenberg table. While the assistants prepare the field of operation the operator disinfects himself again.

Upon entering the peritoneal cavity the patient is thrown into Trendelenberg's posture and the intestines forced into the abdomen, where they are held by large gauze pads. The pelvis being freed from intestines, the operator carefully inspects its contents, and close to the pelvic brim the ovarian arteries and veins are secured by single ligatures of fine silk. (See Plate XXIII.) A ligature is thrown around the ovarian vessels close to the cornua of the uterus. Near the first ligature and outside the ovary and fimbriated end of the tube the operator begins the section of the broad ligament. He cuts through the broad ligament close to the uterine-ovarian arterial anastomosis at the side of the uterus. The ovarian artery upon the other side has been similarly secured, and the broad ligament divided as described. This leaves both ovaries and tubes attached to the uterus. The operation up to this point is precisely similar to

the intra-abdominal supravaginal hysterectomy. The posterior cul-de-sac is now entered, or, if it has been opened at the time the uterus was curetted, the gauze plug is withdrawn and two fingers are inserted into the vagina through the cul-de-sac. The ends of the fingers are hooked beneath the cervix and make upward pressure against the anterior face of the cervix. The operator now begins the separation of the bladder from the uterus. In doing this the fingers in the vagina will be of material assistance in mapping out the relations of the parts. A crescentic incision is made

FIG. 253.



Both ovarian arteries are tied, but the ligature upon the left only is seen. The cul-de-sac is opened, and the bladder has been dissected away from the uterus. The broad ligament has been split to show the course of the uterine artery, which is seen to cross the ureter at its passage beneath the base of the broad ligament. The uterus is pulled to the right. (From a photograph of an operation.)

from side to side across the anterior face of the uterus just above the utero-vesical fold. Laterally this incision stops short of the sides of the uterus. Having severed the peritoneum and loose fascia beneath it down to the uterine tissue proper, the operator dissects the bladder away from the uterus with the ends of two fingers. In doing this he is careful to keep the points of his fingers pressed hard against the uterus, and in this way avoids wounding the bladder. After the vagina has been entered in front, the fingers are withdrawn from the vagina and the two indices are inserted into the posterior cul-de-sac, while the middle fingers are placed between the bladder and uterus. The hands are back to back, and, as the operator separates them by pushing outward, he pushes away from

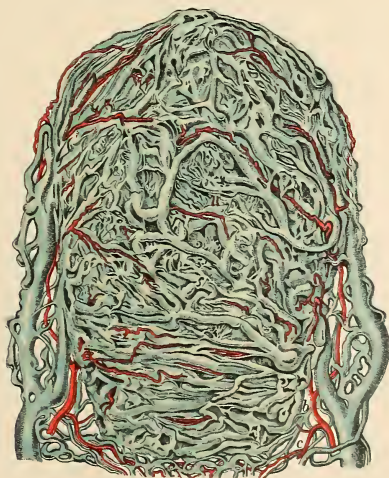
# PLATE XXII.

FIG. 1.



Arterial Blood-supply of the Uterus and Adnexa: *O. A.*, ovarian artery; *a', a', a'*, branches to ampulla of Fallopian tube; *a', c', c'*, branches to ovary; *c*, branch to fundus; *d*, branch anastomosing with uterine; *b*, branch to round ligament; *e*, uterine artery; *g, g, g*, vaginal arteries; *b, b*, azygos artery of vagina.

FIG. 2.



Venous Blood-supply of the Uterus: *b*, uterine artery; *c*, vaginal artery.

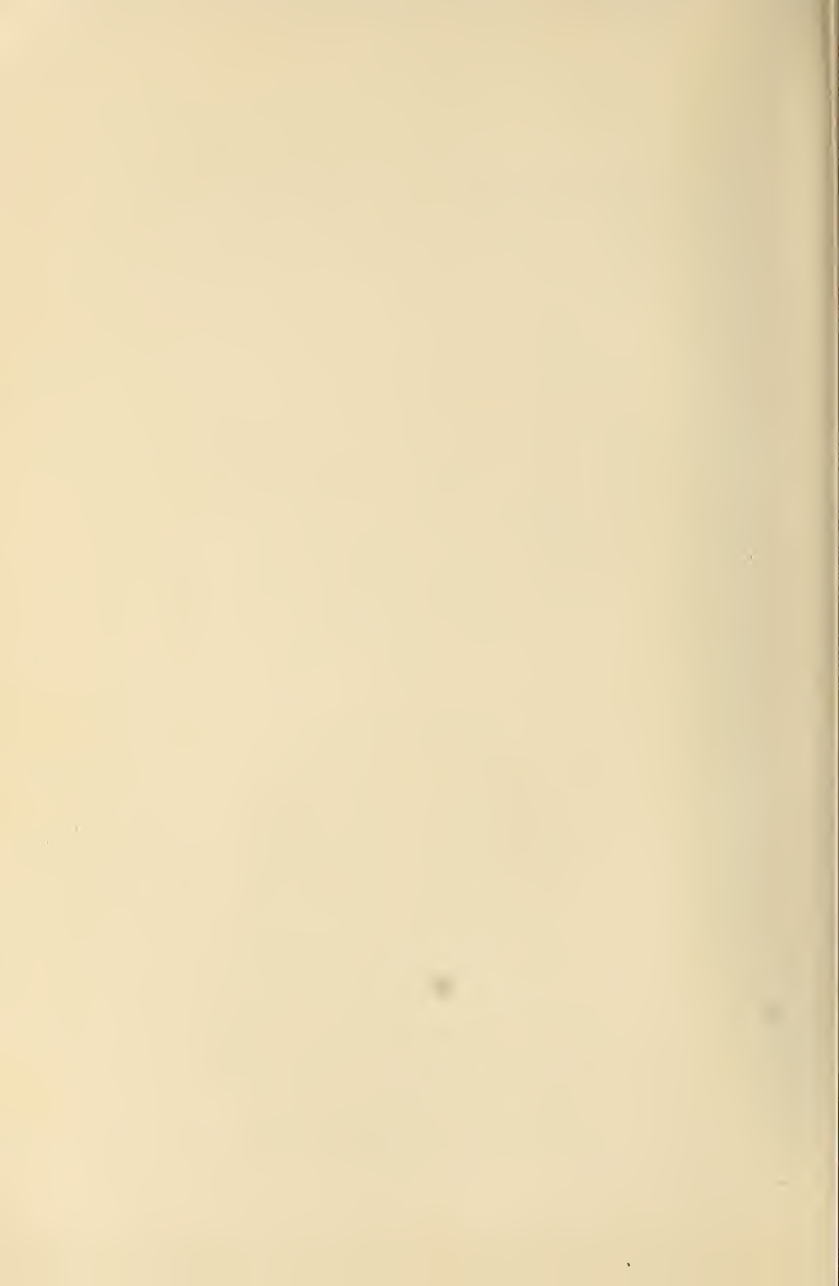
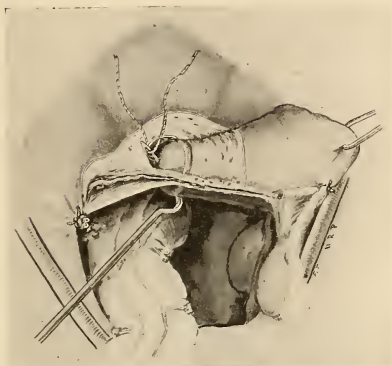


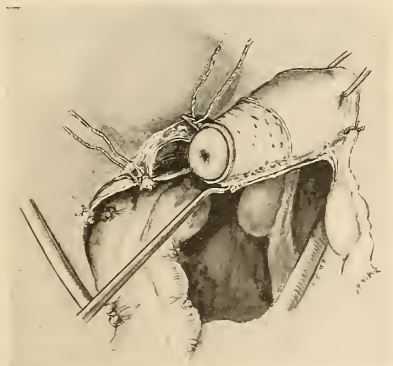
FIG. 254.



The Deschamps' needle circles the strip of tissue to the left of the cervix, which contains the uterine artery, by passing through the open cul-de-sac behind, across the vagina, to emerge from the open cervico-vesical space. The ureter is well shown at the outer end of the rent in the broad ligament. (From a photograph of an operation.)

the uterus all loose tissue upon each side, and this he does until he finds the uterus entirely free except at its lateral margins. He may

FIG. 255.



The left uterine artery has been tied *en masse* and the uterus cut away from all attachments on the left. The uterus is tilted far over to the right. The Deschamps' needle is passing through the base of the right broad ligament to secure the right uterine artery. Both ovaries and tubes are seen. (From a photograph of an operation.)

now proceed in one or two ways: He may ligate the uterine artery either *en masse* or in continuity upon one side between the folds of the broad ligament and about half an inch from the cervix, then cut



away the cervix, and ligate the uterine artery in a similar manner upon the other side, and remove the uterus and adnexa; or, if he be cramped for space or is embarrassed by capillary bleeding, he may secure each lateral pedicle containing the uterine arteries with heavy forceps and remove the uterus, subsequently ligating the uterine vessels after the uterus and adnexa are out of the way. Much time will be saved if the operator secures the stump, holding the uterine arteries by ligatures applied to the tissues *en masse*, and without seeking to pick the uterine vessels out. In doing this he uses very heavy braided or twisted silk and ties it with great force, the loop circling all the tissue upon each side of the cervix. The

FIG. 256.



The completed operation. Both ovarian arteries are shown tied and the ligatures cut short. The stumps of the broad ligaments containing the uterine arteries are drawn down into the vagina. (From a photograph of an operation.)

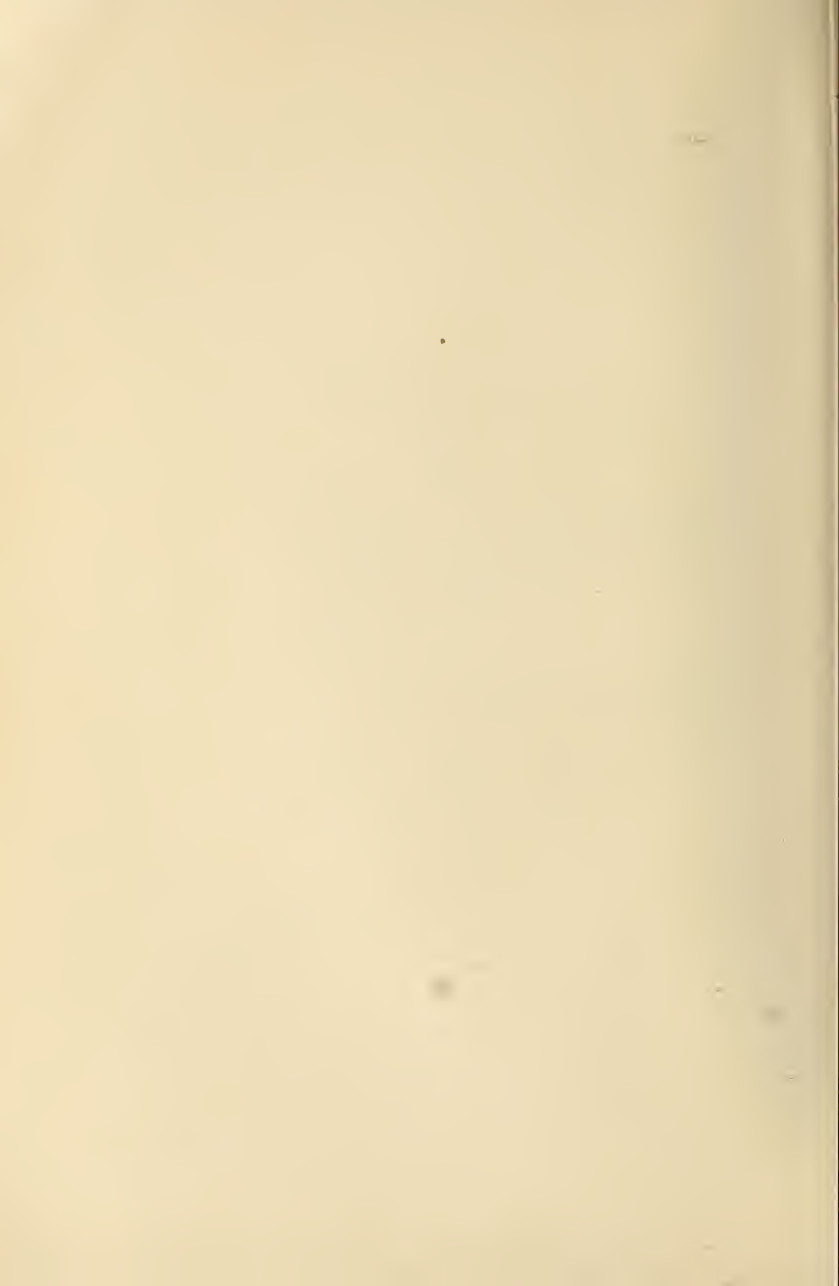
ligatures on the ovarian vessels are cut short, while those upon the uterine arteries are left long and turned down into the vagina. The vagina is filled with iodoform gauze, the upper end of which, nicely smoothed over, protrudes but a fraction of an inch above the incision in the vagina. If the azygos artery on the posterior vaginal wall is large enough to spout, it is secured by catgut ligature and any bleeding points on the bladder wall are similarly tied. The pelvis is wiped dry and the patient lowered into the horizontal posture. It will now be seen that the bladder and rectum fall together, completely shutting from view the vaginal wound and stumps of the

PLATE XXIII.

Fig. 1.



Total Abdominal Hysterectomy : first step.



uterine arteries. The gauze pads are removed from the abdomen and the abdominal incision is closed (see Technique). Instead of drawing the uterine artery stump into the vagina and packing with gauze, the edge of the vaginal mucous membrane may be whipped together by a continuous catgut suture, and over this the edges of the peritoneum may be similarly united, burying the stumps of the artery between the vagina and peritoneum. By this procedure subsequent attention to the wound is dispensed with. The ligatures on the arteries have of course been cut short. (See Plate XXV.) The urine is drawn and the patient put to bed. On the eighth day, if the temperature has been normal, the patient is placed in the lithotomy posture and the vaginal dressing changed. The ligatures on the uterine arteries, if they have been left long and turned into the vagina, may be cut after this at any time or may be allowed to come away later. Traction upon them is not to be made. The mass of lymph which forms about the vault of the vagina implicates the bases of the broad ligaments which contain the stumps of the uterine arteries, and the resultant scar holds the vault of the vagina high up.

Where very large fibroids are to be dealt with, it is advisable to evert the tumor before securing the vessels or attempting the ablation. In certain of these cases the tumor may be constricted by a stout elastic ligature applied above the cervix and the great mass of tissue removed. This procedure is particularly applicable where the larger tumor of a nest of growths is pedunculated.

The operation for *intraligamentous fibroids*, proposed by Pryor, proceeds as described up to the point of securing the ovarian arteries. This artery is secured upon the *free side* only at this time. After this is done the operator dissects away the bladder from in front and ligates the uterine artery upon the *free side*. He now cuts the uterus away upon this side, opening the vagina as freely as possible. In order to secure the uterine artery upon the side of the intraligamentous nodule, he has an assistant tilt the uterus far over to the side of the nodule, so as to expose the interior of the vagina. The sharp Deschamps needle, threaded with stout silk, is passed close to the cervix up to the sulcus between the cervix and intraligamentous growth. The needle is forced around the uterine artery and emerges into the vagina again. It is tied and the cervix cut loose. It is now a very easy matter to peel the nodule out of the broad ligament without causing hemorrhage, and, when once freed, the uterus is held by

the folds of the capsule of the nodule. A few strokes of the scissors applied upon the anterior and posterior faces of the uterus close to its side will take the uterus and tumor away. If the Fallopian tube be spread over the capsule, its removal is not attempted, but the ovarian artery on this side is tied close to the cornu. The operator seeks to avoid splitting the capsule of the nodule, for in doing this he severs large venous sinuses and runs the risk of cutting a possibly misplaced ureter. The venous sinuses must be ligated if cut, and this conduces to the formation of sometimes enormous hematoceles beneath the peritoneum. Sometimes the tumor, as it grows out into the broad ligament, pushes the uterine and ovarian anastomosis outward. In such a case the uterine artery will still be secured by the Deschamps needle applied to the sulcus between the tumor and cervix. Although the uterine artery is always at the sulcus mentioned, its anastomosis with the ovarian artery and its branches to the cervix may be displaced outward by the intraligamentous nodule. But these branches are rendered dry by the ligation of the ovarian artery above and of the uterine below. Hence they cause no bleeding when the nodule is pulled out. The operator, not being positive of his anatomical relations, must adopt the only safe method of enucleating the fibroid and removing it with the uterus. So long as he avoids incisions into its capsule and injury to the periphery of the capsule, he will not wound the ureter and will develop no bleeding of moment. Heretofore it has been the custom to split the capsule of the tumor above and shell out the nodule from between the severed folds of the broad ligament. In doing this there is much time lost, a good deal of hemorrhage developed from the large sinuses that cover these nodules, and very often has the ureter been wounded. This latter structure may lie beneath the nodule, over it, in front of it, or even posteriorly. We never know just where to find it, and there is always great risk of wounding it. There is, however, one spot in which it is never found, and that is directly against the cervix in the sulcus formed by the junction of the tumor and the uterus. The position of the uterine artery to these growths is constant. It lies beneath the tumor, and is always secured by the ligature applied as described. The capsule of the fibroid nodule collapses after the uterus is removed and requires no attention. The abdominal pressure causes it to remain closed, and drainage from its cavity is carried away by the vaginal dressing.

PLATE XXIV.

FIG. 2.

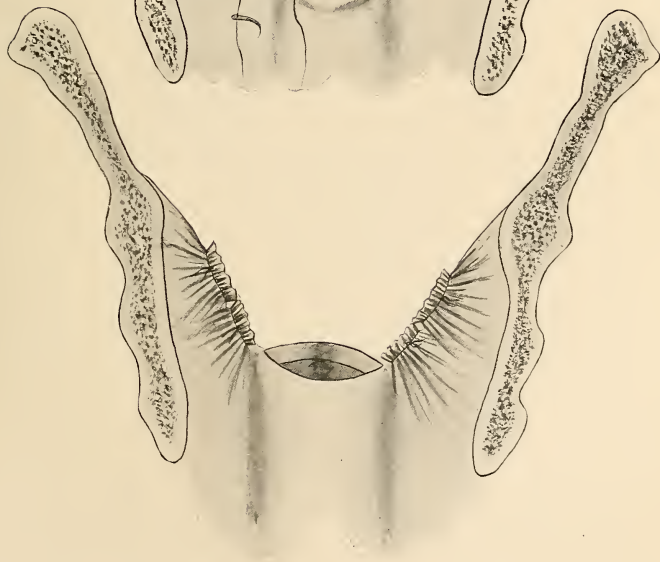
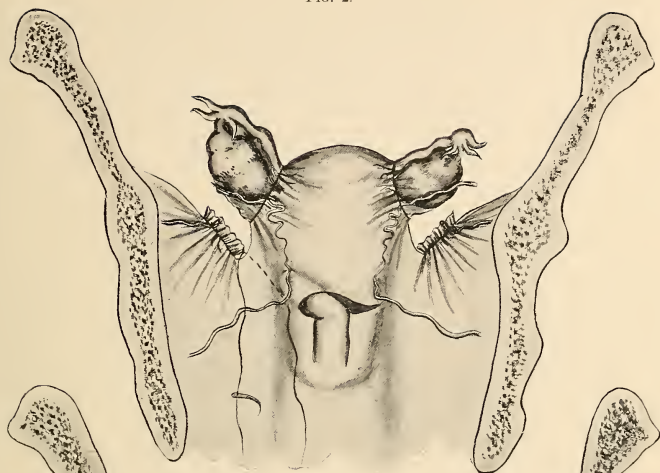


FIG. 3.

FIG. 2.—Total Abdominal Hysterectomy: second step. Vagina opened anteriorly, with the index finger in the vagina, while the ligature is being placed about the uterine artery.

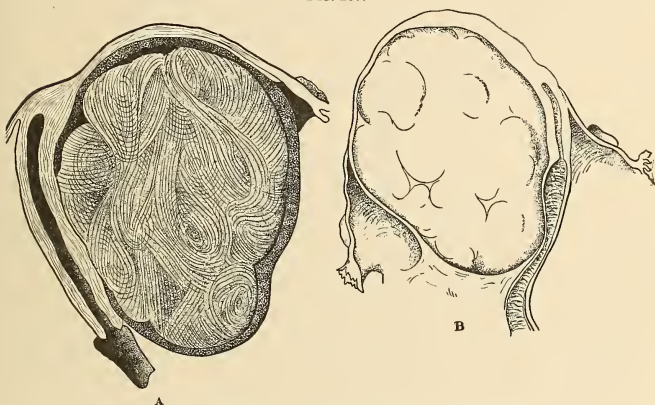
FIG. 3.—Total Abdominal Hysterectomy: ovarian and uterine arteries ligated and uterus removed, leaving the vaginal vault opened.





Fibroids dissecting into the broad ligament, posteriorly beneath the peritoneal folds of Douglas's cul-de-sac, anteriorly into the bladder, or laterally toward the pelvic walls, are the most formidable growths the surgeon meets. They are not amenable to the tardy benefits to be derived from medicinal treatment or the operation of salpingo-oöphorectomy.

FIG. 257.



Intraligamentous Fibroma: A, abdominal variety; B, pelvic variety.

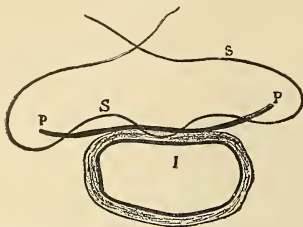
They can be removed by but two procedures: either by total extirpation or by the intra-abdominal amputation method, as already described.

*Complications met during the Operation.*—*Adhesions* may be entirely absent with the largest tumors, and, conversely, small tumors may present the most firm adhesions to important structures. They may attach the growth to any of the pelvic and abdominal contents, and are invariably of inflammatory origin. The adhesions are of two kinds, occurring as longer or shorter bands or as a close union between broadly adjacent surfaces. Bands are sparsely supplied with blood, but unions by broad attachment are very vascular. It occasionally happens that the fibroid will derive its main blood-supply from an adventitious adhesion. This is especially the case where subserous fibroids are attached to the omentum.

Band-like adhesions not very vascular may be torn with the

fingers or by scissors. Those which are vascular must be cut between two ligatures. Separation of the adhesions when broad must be made at the expense of the tumor, and not of the tissue to which it grows. This is pre-eminently the rule when the tumor is

FIG. 258.



Suture of the Thin Fold of Peritoneum and Fibrous Tissue left after the Detachment of a Firm Adhesion from the intestine: *I*, intestine; *P*, peritoneal fold covering the fibroid; *S*, suture.

closely adherent to the gut. Adhesions are most general and firm when there have been former attacks of peritonitis.

Very commonly hypertrophic salpingitis and chronic oöphoritis are associated with fibroid tumors. But inflammatory lesions of tubes and ovaries are generally due to a septic or specific endometritis. As frequently producing such changes in the endometrium are the various means applied for the relief of hemorrhage and attempts at reduction of the tumor. Such are filthy curettements and injections of astringents. In other words, here more than in the uterus, not the seat of neoplasm, do we find improper intra-uterine manipulations one of the causes of complications in the adnexa or peritoneum. Milder degrees of tubal inflammation may result in occlusion only, thus producing hydrosalpinx.

It must not be forgotten that fibroid may exist coincidently with ovarian cystoma. Pus-tubes or ovaries should, if possible, be removed before the extirpation is begun, and the greatest care must be exercised not to permit the escape of any pus to soil the pelvic cavity. But cases do occur where the extirpation must first be made, the pus-focus being tied off from the tumor and enucleated as a last step.

In such cases the gauze packing must extend to the denuded surface produced by the removal of the pus-focus.

**GENERAL CONSIDERATIONS.**—The treatment to be selected for each case must not be determined by the character of the tumor

PLATE XXV.

FIG. 4.

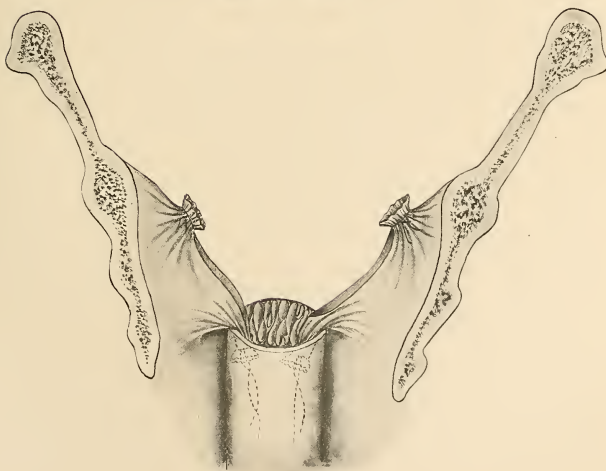
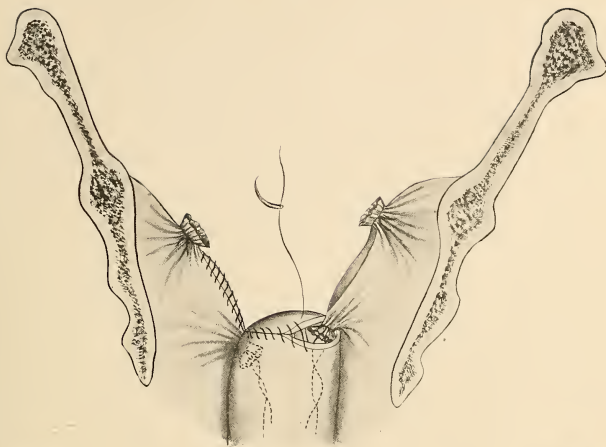
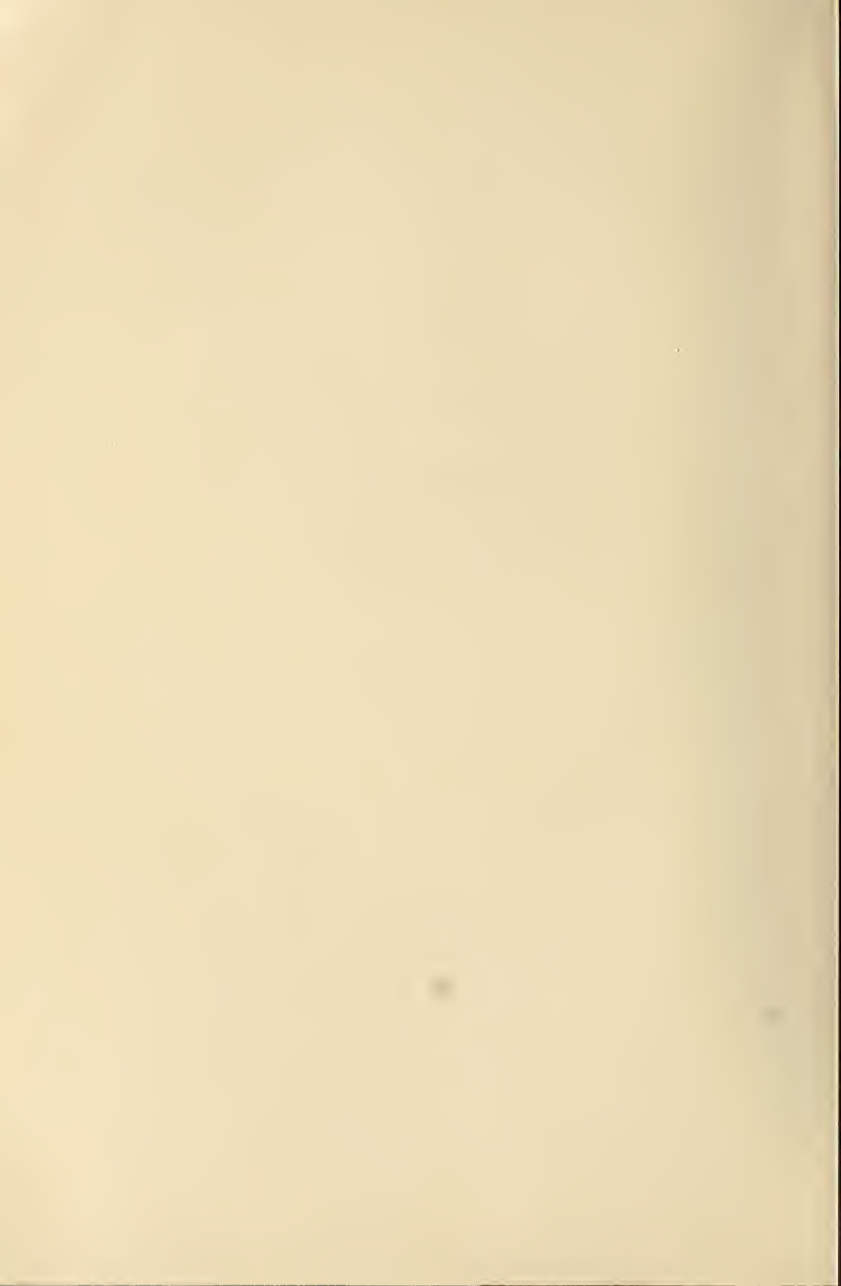


FIG. 5.

FIG. 4.—Total Abdominal Hysterectomy: vaginal vault in process of closure, with lower stumps drawn into the vagina. Opening in the left broad ligament closed.

FIG. 5.—Total Abdominal Hysterectomy: stump drawn into the vagina, and vaginal opening packed with gauze.



alone. Other considerations are to be entertained before arriving at the final conclusion. A patient who is in easy circumstances, who can afford idleness, and can secure comforts may well spare a few months of her life devoted solely to the effort of getting well by palliative and mild methods. The poor woman, a burden to her friends and unable even to secure necessary physical rest, will demand a measure which is radical. The general physical condition of a patient will determine the character of the operation more than any other one thing. An exsanguinated woman who is in good flesh will usually stand a long operation very well. Prolonged narcosis is dangerous if there be kidney or heart disease. Therefore it may be that many of the radical procedures would waste valuable time, and the most rapid method must be employed, even though it be incomplete. In skilful hands it does not take longer to extirpate the entire uterus than to properly attend to the stump by the various other methods. Some of the other methods have limitations, and there are certain tumors not amenable to each operation. Suprapubic extra-peritoneal amputation is not to be applied to virgins who have very short vaginæ, to fibroids which dissect into the broad ligaments, to those which burrow into the floor of the pelvis, and to those which already are septic.

Hegar's or Tait's operation of removal of the adnexa to induce artificial menopause and cut off part of the blood-supply has produced results which command our most careful attention. That it will check the growth of some tumors, and often cause them ultimately to disappear, is undoubted. But it is not immediate in its effect on the size of the growth, though the hemorrhages may cease at once. Therefore those tumors which have dangerous or very painful pressure effects demand a more radical procedure. It is hard to say just when the operation should be applied to the exclusion of all others, for tumors which respond most readily to this treatment also give the best results from a radical operation. Certain interstitial and subserous tumors require the greatest skill in their removal. In certain rare cases of intraligamentous growths, and in patients who will not bear a radical operation, we would suggest the salpingo-oöphorectomy. Tumors of the soft, oedematous, fibro-cystic variety are but little, if at all, influenced by this operation. It is, then, limited to cases of hard myo-fibromata, and chiefly to those in women under thirty-five. It must undoubtedly be considered an incomplete operation with a limited application, for the natural meno-



pause does not often come on in the presence of fibroid. In fact, the latter continues the bleedings indefinitely. Removing the ovaries and tubes, then, very often utterly fails in stopping the bleedings, for the operation merely removes the least factor in the causation of the hemorrhage, the adnexa. It does limit the bleeding somewhat in all cases by cutting off the blood-supply through the two ovarian arteries, and removal of the adnexa takes away the stimulus to menstruation. But the perverted and pathological function has usually gone too far to be controlled by such mild means. There are very many cases in which the operation is so difficult as to be practically impossible. It can only be recommended in an extremely limited number of picked cases.

In his last work Tait quotes 262 cases with 4 deaths—1.5 per cent. mortality, about that incident to the electrical treatment, with vastly less suffering, much better results, and less injury to the woman in case the operation fails and a radical one becomes necessary. But these figures are for uncomplicated cases of fibromyoma.

We would, then, summarize the treatment of fibroids about as follows: Small fibroids which can readily be removed *per vaginam* may be subjected to that method. All others demand different procedures.

The patient's general condition and the character of the tumor would determine whether or not to operate. Cases in which the decision is against operation should be treated by ergot and ammonia.

An operation deemed advisable, total extirpation is indicated. The intra-abdominal amputation method is equally as good, it being in all essential respects a total extirpation, provided there is absolutely no possibility of malignant or tubercular disease being present. This operation has the advantage of being less dangerous than that of total extirpation.

The intra-abdominal methods of Zweifel and Schroeder are no longer necessary. The great leap has been from the extra-peritoneal operation to the intra-abdominal methods; and at the same time we leave a partial operation with a tedious convalescence, adhesions about the stump, and possibly hernia, for a complete operation, with a mortality less than 5 per cent. in the worst kind of cases, and no disagreeable sequelæ. In *selected* cases which have escaped electricity and other intra-uterine treatment the mortality should not be more than 3 per cent.

PLATE XXVI.



Intraligamentous Fibroid Tumor of the Uterus with Hydrosalpinx, showing the portions of the tumor which were buried under the peritoneum in the connective tissue: front and back views.



## PELVIC INFLAMMATION.

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It is intended to include under this heading all those inflammatory pelvic diseases which involve the Fallopian tubes, the ovaries, the pelvic peritoneum, and the pelvic cellular tissue—all those conditions described by the terms salpingitis, pyosalpinx, ovarian abscess, perimetritis, parametritis, peri-uterine phlegmon, pelvic abscess, pelvic cellulitis, pelvic peritonitis. These conditions are so intimately associated and so constantly complicate each other that it becomes impossible to treat of one without taking into consideration several or more of the others. Rarely does a pyosalpinx exist except it be complicated by a pelvic peritonitis, and in all probability a pelvic cellulitis, the peritonitis and cellulitis arising from the same source as the salpingitis, and not being independent lesions. The abscesses, for the most part, are results of the more advanced stages of these same conditions, and in themselves rarely exist as independent factors. It is hard to study these inflammatory productions without seeing a direct line of cause and effect. With our present knowledge of these matters it is no difficult thing to trace the infection from its inception, and to recognize its course in the lesions left behind as it pursues its destructive way.

It is our purpose, then, to deal with this subject as though treating a single disease—which in fact and in truth it is—and with each of the resultant factors as simply the same disease attacking, in its progress, the different anatomical portions of the female pelvis, leaving in each locality an apparently different and independent lesion, the lesions differing in accordance with the structure attacked, with the severity of the attack, and with the stage at which the progress of the disease has been stayed. It were just as rational to consider the peritonitis, the cellulitis, and the abscesses complicating an appendicitis as independent of the inflammation of the appendix as to separate these same conditions from the salpingitis. In the case of the appendicitis the infection comes from inside the appendix, and,

having passed through its walls, attacks first the peritoneum, and secondly the cellular tissue.

In the same manner does the infection which destroys the pelvis come from the Fallopian tube, only, instead of being compelled to pass through the walls of this organ, it the more readily finds its way through the fimbriated opening directly into the peritoneal cavity and secondarily into the connective tissue. The amount of destruction accomplished will of course be in direct relation to the severity of the infection. Some attacks will not proceed further than the Fallopian tube itself, and often even end there without supuration. The inflammatory process may extend into the peritoneal cavity and confine its ravages to the peritoneum itself, or it may extend deep enough to involve the cellular tissue, causing this to break down and suppurate. The reason these differences exist in individual cases is only to be explained by the character of the infection and its virulence. At times two given cases will not progress in exactly the same manner, even where the origin has been the same. Some local condition may exist so as materially to modify the course of the disease in the one case, while the other one may proceed rapidly to an amount of destruction which can never be repaired, if not unto death itself. When it is fully realized that this whole group of diseases originates from a common point and from a limited variety of infections, the importance of a careful study and understanding of these becomes at once apparent.

Inflammations of the female pelvis and pelvic organs constitute a very large proportion of the diseases of women. They are the most destructive and dangerous, as well as the most incurable, cases that the physician has to treat, provided they once gain headway or have accomplished their ravages before they come under observation. At the same time, taken in their incipency, they are readily retarded and cured. As in all other conditions, where it can be accomplished, it is much easier to prevent the subsequent ravages of the inflammation than to cure the resultant lesions. As a rule, after the fire has once swept over its course such destruction has resulted that a cure short of surgical methods is out of the question, and at times even these are unavailing. Once allow a woman to contract pelvic inflammation with all its possibilities, and allow the disease to run into a chronic condition, the chances are that she will have acquired such a degree of invalidism as to feel the results for the rest of her life, even though the disease be removed. Many of these women

never, under the most favorable circumstances, regain their former state of health.

CAUSATION.—Pelvic inflammations arise almost without exception from either septic or specific infection. The exceptions are those rare cases in which the disease has had its origin in a sudden suppression of menstruation or where it is due to the irritation of neoplasms, such as fibroid tumors and ovarian cysts. Even in these exceptions it becomes a question at times whether or not the peritonitis, be it acute, has not originated from septic material contained in a diseased Fallopian tube or ovary. Chronic inflammation may readily be engendered by the irritation due to the presence of an abnormal growth in the pelvic cavity, but such a process seldom brings about such disastrous results as do the acute inflammatory attacks. The changes here are more of a gradual thickening and hypertrophy of the epithelial and interstitial elements, and there is little or no danger of resultant adhesions or abscesses. A very great many neoplasms are complicated by disease of the Fallopian tube. It is obvious what chances there are of a leakage of infective material from an enlarged and diseased tube. Even where there is no leakage through the fimbriated end, or no rupture of the walls of the organ, yet it is a well-known fact that the peritoneum about these members is peculiarly liable to attacks of inflammation, probably by extension of the disease directly through their walls. Any given case of pelvic inflammation complicating the growth of a neoplasm is always open to the just suspicion that there is, in addition to the new growth, a lurking infection in the Fallopian tube. In such a case the cause of the inflammation would again be sought in a septic or specific poison, brought about in much the same manner as are the vast majority of cases of pelvic inflammation. It is well known that the rupture of some cystic tumor, and the emptying of part or all of its contents into the abdomen, may give rise to this same character of trouble. These cases are, however, the exception, and usually, when they do occur, it is not difficult to differentiate them. Those cases which are apparently due to the traumatism incident to operations, the use of the uterine sound, the introduction of sponge tents, and other similar procedures are beyond doubt caused by the addition of septic poison to the traumatisms, and not to the mere wounds themselves. Careful use of ordinary antiseptic precautions will obviate any chance of such mishaps. If a patient is suffering from venereal disease, and a solution of continuity of the



mucous membrane, either of the vagina or uterus, is made in the course of an operation or an examination, it is hardly to be expected that there will be a universal escape from some of the disasters of a spread of the infection into the connective tissues through the open wounds so made.

If, however, the disease be cured prior to an attempt at operative procedures, or even if great care has been taken to disinfect the parts to be operated upon, the chances of infection are minimized. The same may be said of infection carried by dirty instruments during the course of an examination. It is extremely problematic whether or not many cases have resulted from such sources where even the most ordinary care has been taken with the implements used. A speculum or a pair of dressing forceps must be noticeably dirty to carry infection from one patient to another, particularly if the mucous membrane of the vagina is reasonably sound and healthy. The danger resulting from the use of a sponge tent is likewise due to a septic condition of the tent or of the vaginal or uterine canals; and so with most other instruments usually held accountable for the origin of pelvic inflammations.

As in the case of neoplasms, so in all cases that require the use of instruments, it is far more likely that there is already existing the source of infection in the Fallopian tubes, ovaries, or peritoneum than that the use of these instruments has originated the attack. If a woman has a diseased and possibly adherent Fallopian tube, especially if it be distended with pus, any manipulative interference will surely tend to relight an inflammation which has become quiescent, and has probably remained so for years. If the disease be originated by the mere use of the instrument, it is almost certainly not due to the introduction of septic or specific poison as an additional element in the case. It is problematic whether traumatism *per se* ever originates pelvic inflammation. The peritonitis due to sudden suppression of menstruation does not, as a rule, leave behind it any such traces as are left after an attack of septic peritonitis. The inflammation is of a frank, open character, without usually any tendencies to the exudation of plastic lymph, such as will not subsequently be absorbed. When such an attack has cleared up, there are left no microscopic lesions, except it be in the ovary itself, and here the changes are more likely to be of an interstitial character, such as follow chronic inflammation in these organs. Frequently these attacks do not amount to anything more than a severe congestion,

stopping short of true inflammation, rest in bed and depletion accomplishing a speedy and permanent cure. Pelvic peritonitis caused by venereal excess, independent of any other factor, is more than doubtful. The traumatism, it is true, incident to such excess would tend to foster such a result, but the continued relief from congestion due to the repeated normal terminations of coition would tend to promote anemia of the parts rather than congestion. As in the case of many other supposed causes, a previously diseased condition of the uterus or uterine appendages is in all probability at the bottom of the trouble, in which case it is easy to understand how the incidental and repeated traumatism would bring about the result.

Septic or specific infection of the genital canal is the cause of the vast majority of pelvic inflammations. Septic infection enters in one of two ways: either through wounds caused by operations (the use of tents, the use of the uterine sounds, specula, and other instruments) or through the wounds caused by childbearing and abortion.

Puerperal septicemia outweighs by far all the other sources of septic trouble, and compared with this source the others are practically nil. Puerperal septicemia rivals, and even exceeds, gonorrhea as an etiological factor in these diseases. The analysis made by Bernutz of 99 cases of pelvic peritonitis shows at a glance the two great factors in the production of pelvic inflammatory troubles:

43	occurred in puerperæ;
28	“ after gonorrhea;
20	“ during menstruation.
8 traumatic	$\left\{ \begin{array}{l} 3 \text{ due to venereal excess;} \\ 2 \text{ “ syphilitic disease of the cervix;} \\ 2 \text{ “ introduction of the uterine sound;} \\ 1 \text{ “ use of the vaginal douche.} \end{array} \right.$

This table is susceptible of considerable modification, and if the whole truth were known it is more than probable that every case in it could have been traced to gonorrhea or post-puerperal septicemia had as much been known of these troubles in the time when the cases were tabulated as is known about them at the present time. It is more than probable that in every one of the 8 traumatic cases and in the 20 recorded as occurring during menstruation, there was present in the pelvis a pre-existing inflammatory disease which was only awaiting some favorable opportunity to

develop. That twenty of the attacks took place during the menstrual period is only what could be expected. At this time there is a natural congestion of the pelvic organs; this congestion, added to the already existing inflammation, latent perhaps, but none the less real, would place the patient in the best possible condition for any outside influence to determine the resulting acute attack of pelvic inflammation. Forty-three of the cases are recorded as occurring in puerperæ, and twenty-eight after gonorrhea. A second glance is convincing that in all probability a few of the puerperal cases were caused by gonorrheal infection—just what proportion it is impossible to tell. The argument might, in fact, be brought to bear in every case of post-*puerperal* septicemia, that the woman had previously been infected with gonorrhea, else she would not have developed the *puerperal* disease. Such is undoubtedly the case in many instances, but, in spite of the great possibility of such an occurrence, there is yet a large proportion of cases which undoubtedly arise from a *puerperal* septicemia, entirely independent of venereal contamination; the proportion is fully as large as in that class where the cause is unquestionably gonorrhea. This is even true of many of those women whose husbands have perchance contracted a gonorrhea in their younger days before marriage. Because a man has once been afflicted with venereal contamination, it by no means follows that he always retains the disease, as has been contended by some writers, nor that he is sure to contaminate any woman with whom he has intercourse. Whether or not the gonococcus is the cause of gonorrhea, it is notorious that many discharges contain this factor without being able to reproduce the disease. It has been shown, also, that it is not possible to infect the healthy mucous membranes with the discharges from some cases of chronic gleet. On the other hand, experiments have been produced to show that quite the reverse of this is true. However this may be from an experimental point of view, certainly the relation of cause and effect in such a case as the following is apparent: A young and healthy woman is married to a man who some time previous to their marriage had contracted gonorrhea, but of which he was cured before the ceremony. She bears one, two, or three children successively, always making a satisfactory recovery and remaining in robust health. Following a third or fourth pregnancy she develops *puerperal* septicemia, and is ever afterward a sufferer. It can hardly be contended in such a case that gonorrhea

played a very important rôle in the production of the septicemia. Large numbers of women suffering from pelvic inflammatory diseases give practically the same history as this, less the fact that the husband had pre-existing venereal infection.

Generally, when a woman contracts gonorrhea the first step is the production of a vaginitis. As it is but a short distance from the vagina to the uterus, this is usually quickly traversed. Occasionally there is no vaginitis noticeable, the first lesion being an endometritis. The uterus, in case the infection is of puerperal origin, is the original seat of the attack. Whether or not the disease starts or exists elsewhere, an endometritis eventually develops in every case of gonorrheal or puerperal pelvic inflammation. This fact is important to bear in mind when it comes to the treatment of the disease, both as to prophylactic measures and as to the final cure, even though surgical treatment has been necessitated and carried out. Practically, the mucous membranes of the uterus and the Fallopian tubes are one and the same, the anatomical differences not amounting to more than a change in the character of the epithelium.

The disease has one unbroken line of membrane over which to extend and reach the peritoneal cavity, and it is only a matter of surprise that it ever confines itself to the lining membrane of the uterus. That it does so in many cases is, however, beyond dispute. If the infection be confined to the uterine body, the dangers of a peritonitis are very small, as the chances of the poison being carried through the uterine walls by way of the lymphatics are not great. The extension is nearly always by way of the Fallopian tubes, the exceptions to this being found amongst the puerperal cases; and even here an example is met infrequently. In such cases we would naturally expect the cellular tissue about the uterus to first become affected and to undergo suppuration. As a matter of fact, such conditions exist only occasionally, the cellulitis being almost universally secondary to the inflammation of the peritoneum.

One of the many proofs that the infection has proceeded directly from the tube itself, and not from the uterus by way of the lymphatics, is that it is rare to find traces of inflammation in the shape of adhesions on the anterior surface of the broad ligament, between this structure and the bladder. The evidences of the infection are almost universally found on its posterior surface, between the ligament and the sacrum. This would seem to be accounted for by

the anatomical position of the tube and ovary on the posterior surface of the broad ligament.

The more virulent the infection and the more rapidly it extends, the greater will be the chance of its reaching the peritoneal cavity through the open fimbriated end of the Fallopian tube; the greater, in consequence, will be the destruction to the various organs, and the more will be the chance of a fatal termination.

As the infection extends from the uterus, it spreads at once along the mucous membrane of the Fallopian tube, out of its fimbriated opening directly to the ovary and into the pelvic peritoneum.

**PATHOLOGICAL ANATOMY.**—The inflammation engendered by the infection, whatever it may be, is in all respects the same whether confined to the Fallopian tube, the ovary, a part or the whole of the pelvic peritoneum and cellular tissue, or to the whole abdominal cavity. It is simply a question of anatomical limitation, the extent of limitation being determined by the character of the infection, its virulence, and the ability of Nature to quickly meet and confine it within a limited space. Usually, Nature is capable of meeting the invasion more than halfway, and she not infrequently shuts off the most important avenue of approach to the pelvic cavity by firmly sealing the fimbriated opening of the tube. If she be successful in accomplishing this, there is no very great danger that the inflammation will pass through the walls of the tube, and thus infect the pelvic cavity to more than a limited extent. The possibility of this must be borne in mind, as undoubtedly the inflammation has spread in this manner, but only, however, in particularly virulent cases. Such instances are the exception rather than the rule.

Whatever be the source or cause of infection, the results are the same up to a certain point, as in all inflammations. The moment the tissues are involved, there occurs first a congestion, followed rapidly by effusion. Resolution may or may not follow later in the progress of the case; the rule is that it takes place to a greater or lesser degree. If resolution does not occur, either organization or suppuration is the final step. Whether the inflammation be a superficial one, involving only the mucous membranes of the Fallopian tube or the serous membrane of the pelvic cavity, or whether it will extend into the deeper structures of these parts, will depend in great measure on the virulence of the attack and its rapidity of advance. For the most part, the disease invades, to a greater or



lesser extent, the connective tissues: as a matter of actual fact, few cases of salpingitis and peritonitis exist without some involvement of the deeper and looser tissues. The exudation occurs in two places: on the surface of the membrane and in the underlying connective tissue. In the Fallopian tube the mucous membrane excretes serum which collects and dilates the tube-cavity. This fluid is liable to either discharge itself into the uterine cavity through the uterine opening of the tube, or into the pelvic cavity through the fimbriated opening, or it may be retained and accumulated in consequence of both these openings becoming closed by the inflammatory process. Whether retained or not, it is extremely liable to undergo suppurative changes and terminate in pus-formation. Should this material empty itself into the uterus, it will drain into the vagina, and will eventually be disposed of in a comparatively harmless way. If it remains encysted in the Fallopian tube, we will have formed either a hydrosalpinx or a pyosalpinx; more usually the latter. The amount poured out is variable, depending upon the irritating properties of the infection. Should it discharge itself into the pelvic cavity, whether it has undergone suppurative changes or not, it is liable to set up an inflammatory condition of the pelvic peritoneum, even though this membrane is not already involved. The exudation into the connective tissue varies also in degree and kind. The greater the exudation and infiltration of inflammatory cells, the thicker and denser become the tube-walls. So thoroughly, in fact, may the walls be penetrated by the inflammation that the peritoneum covering them may become involved. The infiltration may subsequently become absorbed; it may remain and undergo partial organization or it may take on suppurative changes. Frequently, when to the naked eye a Fallopian tube appears to be perfectly free from suppuration, the microscope will show indubitable evidence of the infiltration of pus-corpuscles into its walls. This may, and does, frequently extend to the degree of rendering all the involved tissues so thoroughly friable as to cause them to break down under slight manipulation or under the pressure of a ligature. A ligature will at times cut through such tissue like a knife, the blood-vessels alone offering any great resistance, and even these give way in many instances. It is not at all unique to see the suppurative process extend so far that pus may readily be extruded from the cut surfaces of the walls of the thickened and diseased tube. Should the infiltrating products of the inflammation not be



absorbed, they may leave the tube in a permanently thickened and hypertrophied condition. There will result in this case an enormous overgrowth of the connective-tissue elements, with a possible permanent infiltration of inflammatory cells. Where the disease in the tube has extended to either of the above conditions, the peritoneum will have become sufficiently involved to throw out plastic lymph, which will undergo partial organization and form adhesions. Should the attack prove a mild one, in all probability the exudation will be absorbed and the case progress toward a complete cure. At times, where the disease in the uterus is quite severe, it will stop short of an inflammation in the tube, and after existing for a time as a congestion may gradually disappear altogether. It is no infrequent thing to find at the time of an operation that the uterus is badly diseased, and the tube is only, as yet, greatly swollen and deeply congested, but without showing any signs of infiltration. So also with the peritoneum. A badly crippled tube may exist, the fimbriated end becoming closed and adherent to the ovary, with the tube-cavity distended by a muco-purulent serum. The serous membrane may simply be congested, with no excretion of lymph, no adhesions, no true inflammation. The removal of the tube with its contained source of infection and irritation is amply sufficient to put a stop to further advance of the disease: before the patient is recovered from the operation all traces of the peritoneal congestion will have disappeared.

Should the inflammation have spread from the tube to the pelvic cavity, either by the extension of the disease from the tube through its fimbriated opening or by the subsequent pouring out of the excreted tubal serum, which has undergone muco-purulent changes or not, or by direct extension through the walls of the tube itself, the disease takes on exactly the same form as it would in any other serous membrane, differing only in so far as the anatomical features differ. The pathology of peritonitis is like that of inflammation of other serous membranes—first, congestion, then transudation of blood-serum, and, finally, an exudation of plastic material. Should resolution take place, these inflammatory products are disposed of by absorption of the serum and organization of the exudate. Organization simply consists in the development of the circulation in the exudates sufficient to prevent their degeneration. Should this not occur, they usually break down into suppuration. The exudation

of the serous membranes assumes one of three forms: *fibrinous*, *serous*, or *suppurative*.

In the fibrinous form, should two opposing surfaces touch each other, they will almost certainly become adherent until such time at least when the lymph becomes absorbed. If it does not finally disappear by absorption, permanent adhesions result, more or less dense and well organized in accordance with the original amount of lymph excreted and the activity of proliferation in the underlying endothelial cells of the serous membrane. The more extensive the involvement of the peritoneum, the more extensive will be the resultant binding together of its various surfaces. Should the exudation prove to be of the serous variety, adhesions are much less apt to form. Varying quantities of free serum, in a more or less changed condition, will be found in the pelvic cavity, and the serous surface will most likely be covered with flakes of lymph. The suppurative variety is simply an advanced stage of either of the other two. As to whether or not suppuration occurs, depends, again, upon the character of the infection. Occasionally the infection is so virulent that the case has progressed to a fatal termination before suppuration has had time to occur.

Should the inflammation involve the deeper tissues, as is almost always the case, effusion takes place into the cellular tissue. The extent to which this will occur is dependent directly upon the activity of the advancing inflammatory process. At times the effusion is slight in quantity, and causes but little distension of the loose areolar tissues; in other cases so much effusion is thrown out as to distend the connective tissues to their fullest extent. The greater the amount of effusion, the more hard and board-like will the part appear to the touch on a local examination. Should the case progress favorably, there will eventually be an absorption of these inflammatory products and the parts will return to a condition of health. Should anything supervene, on the other hand, to prevent Nature from absorbing and disposing of this serum in the ordinary way, it becomes denser and apparently makes an effort at organization. If infective germs should reach it from any direction, suppuration will take place and all hopes of a spontaneous cure will be lost, except through a prolonged and extremely hazardous illness. The extent of the suppuration does not altogether depend upon the extent of the infiltration, for the reason that after this process has progressed to the limits of the effusion it very frequently con-

tinues on, involving the healthy connective tissue, step by step, until eventually it may involve most of the connective tissue of the pelvis, and has even been known to discharge at the umbilicus.

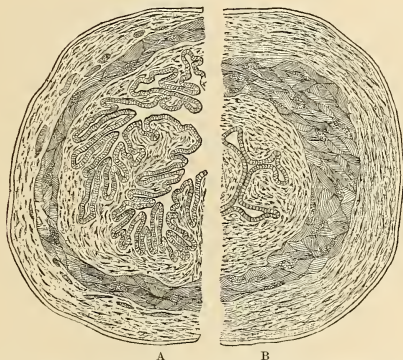
Except in a limited number of puerperal cases, the course and termination of a septic or specific inflammation of the uterus are as described. The few exceptions to this rule occur, as has been said, in puerperal patients. A woman contracts septicemia after childbirth or abortion, by having septic germs introduced into the uterus. The amount of septic material which will be necessary to contaminate a woman under these circumstances will probably be such as would have no effect whatever upon a healthy non-gravid womb. After the placenta has been removed there is left, to all intents and purposes, an open wound, or what would be an open wound were it on any of the skin surfaces of the body.

The incidental wounds due to traumatism add another element to the dangers of this variety of infection. The placental wound is peculiarly liable to pathological changes, for the reason that it is difficult of access and treatment, such as a similar wound elsewhere would receive. Again, the torn ends of the hypertrophied vessels and other tissues are disposed of by a process of degeneration which borders closely upon the pathological—a physiological process which the slightest amount of contamination by septic matter will change into a pathological one. Should such a wound once become septic, the enormously enlarged lymphatics stand ever ready with their gaping mouths to receive and convey into the deeper tissues the products of the suppuration. One would imagine, with the frequency of the occurrence of puerperal septicemia, that this condition would result frequently, when, as a matter of fact, it is the exceptional occurrence. If the septic products are taken up by the lymphatics, the chances are largely that they will be conveyed into the blood without any particular involvement by the inflammatory process of the walls of the lymphatic vessels or of the connective tissue binding them together or through which they pass. At times, however, some additional element seems to be introduced which causes the inflammatory process to rapidly pass along and about the walls of the vessels and lymphatics directly into the surrounding connective tissue, thus conveying the septic material primarily into the connective tissue and rendering any peritonitis which may follow secondary to the cellulitis. The fact of the existence of this class of cases (although of great rarity) does not detract

from the statement that in the vast majority of cases of pelvic inflammation the cellulitis is secondary to the peritonitis, and is consequently only of comparative importance. Usually the treatment directed toward the cure of the peritonitis accomplishes also that of the cellulitis.

*Results.*—The results left in the train of an inflammation beginning in the uterus, extending into the Fallopian tubes, and from thence into the pelvic cavity, are widely variable. In the tube they extend from a slight salpingitis to a pyosalpinx; in the peritoneal cavity, from a mild attack of local peritonitis to a general

FIG. 259.



Normal Fallopian Tube: *A*, section from the ampulla; *B*, section from near the uterus. Layers of the Fallopian tube: 1, upper and outermost layer, serous coat; 2, layer of loose connective tissue, richly supplied with blood-vessels; 3, muscular coat, much thicker near the uterus than near the ampulla. It is principally made up of circular fibres. Above and within it is reinforced by longitudinal fibres, some of which spread into the mucous layer; others (the most external) penetrate between the layers of the broad ligament; still others go to the hilum of the ovary or are prolonged to the fundus of the uterus; a few fibres penetrate to the inner layer. 4, mucous coat. The framework of this layer is embryonic connective tissue, rich in fusiform cells; it projects into the lumen of the tube in longitudinal folds which have been cut through obliquely in the section shown above. Near the uterus these folds are radiating, and give a star-shaped appearance to the lumen in the section. Near the ampulla they are longer and reduplicated, giving the lumen a jagged or toothed appearance on section. The whole surface of the mucous membrane is lined with simple columnar ciliated epithelium; the movement of the cilia is in the direction of the uterus.

suppurative peritonitis and cellulitis; in the ovaries, from a simple ovaritis to an ovarian abscess. In the milder forms of salpingitis the disease assumes the catarrhal type. Here the inflammation is confined almost, if not entirely, to the mucous membrane lining the Fallopian tube, there being oftentimes an accompanying congestion of the other constituent parts. The cause of the tubal involvement is always resident in the uterus, usually in the shape of an endometritis, and occurs by direct extension from one mucous membrane

to the other, the disease in the tube not always being so severe as that in the endometrium. The process exists in both an acute and a chronic form. Neither gives rise to any particular symptoms other than indirect ones, such as sterility. The acute form may run its course rapidly and be cured spontaneously, or may subside as the endometritis is relieved. On the other hand, it may continue indefinitely, and finally become chronic. During the existence of the inflammation, especially in the acute form, an excess of sero-mucous products is thrown out. Where there are no adhesions found, but the uterine and fimbriated ends of the tube remain patu-

FIG. 260.



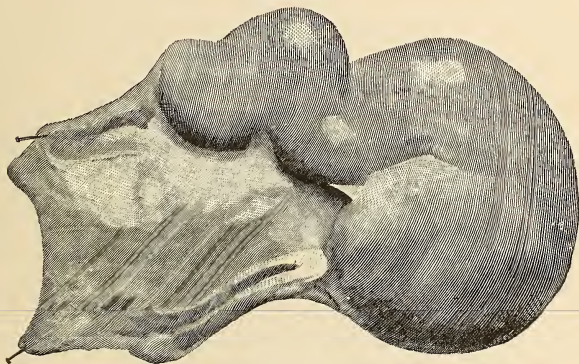
Hydrosalpinx.

lous, these products are drained either into the uterine or pelvic cavities. Should their openings become occluded from any cause, as is at times the case, the sero-mucus accumulates, distends the tube, renders its walls thin, the tube becoming larger and larger as



the contents increase. The condition is then known as hydrosalpinx. The very mild cases seldom terminate in this manner, for the reason that there is not sufficient active inflammation to cause occlusion of the tubal openings. Where a hydrosalpinx exists, it is often found to be adherent to surrounding parts. The fact of the presence of a healthy, non-inflammatory tumor of reasonable size in the pelvis is not in itself sufficient to account for

FIG. 261.



Hydrosalpinx.

inflammatory processes arising in its peritoneal lining. Either the original inflammation, slight as it may be, has spread through the walls of the tumor, which have become much thinned, or there has been leakage of some of the tube-contents, which are acrid and irritating.

Should the inflammation become a chronic condition, which is the more usual procedure, the result is more apt to be a destruction of the ciliated epithelium lining the tube, and a consequent permanent crippling of that organ for its legitimate functions. The desquamation of the epithelium is also claimed to be a sequel of the exanthematous disease. To how great an extent this is true is uncertain. There is not the slightest reason why this mucous membrane should be more affected than that of other parts of the body. Where there has been a general and undoubted involvement of all the mucous tissues in the body there is no reason to expect that this particular one has escaped. Otherwise, the cause and



effect of these diseases are extremely problematic. It is this desquamation of the ciliated epithelium in the catarrhal salpingitis that is in great measure responsible for a large proportion of cases of sterility and extra-uterine pregnancy. The normal function of the ciliated epithelium is to carry all the tube-contents toward the uterus. If in consequence of its destruction the ovum is retarded in its progress until the spermatozoid is too enfeebled to perform its function, or if the ovum simply lodges in the tube and there loses its vitality, sterility must of necessity follow. Again, if the discharges from the altered and diseased mucous membrane are acrid and acid, neither the ovum nor the spermatozoid can survive, or at least they are so enfeebled when they meet that they fail to unite, or if they unite, fail to accomplish their destiny. Should the calibre of the tube be closed at any point throughout its extent, of course an insurmountable mechanical obstruction exists which it is impossible for either element to overcome. If the male and female elements should meet in the tube and the ovum become fecundated, the product of conception is very apt to lodge at some point along the course of the tube and continue its development.

Occasionally the inflammation of the tubal membrane assumes the hemorrhagic type and the excretions are mingled with blood. Provided these muco-bloody discharges empty themselves into the uterus, there will be no more difference in the result than if the excretion were merely mucous or serous. If adhesions close the ends of the tube, it becomes distended with the contained fluid, as in hydrosalpinx, and is then known as hematosalpinx. This occurrence is infrequent as compared with the formation of hydrosalpinx.

When the infection is more severe and extends into the Fallopian tube from the endometrium, involving almost simultaneously all the layers of the tubal wall, the resultant condition is more important as well as more dangerous. Exudation takes place into all the coats of the tube, and the inflammation extends even to the peritoneum. The openings into the tube may become closed or may remain patulous; usually they are occluded. The inflammatory products in the walls of the tubes increase. The walls vary in thickness in accordance with the amount of infiltration, in particularly bad cases being from a quarter to half an inch thick. Attempted organization may take place, the result being the production of an overgrowth of the connective-tissue elements, giving the tube a greater

or lesser consistency. The products of inflammation thrown out by the mucous surfaces are either discharged through the tubal openings or, if the openings are not patulous, are absorbed. The inflammatory products thrown out on the peritoneal covering of the tube assume the form of plastic lymph, and cause the tube to adhere to any other peritoneal surface it may touch. The tube itself adheres commonly to the uterus, broad ligament, and ovary: the fimbriated end usually grasps the ovary tightly, and the fimbria themselves may become destroyed by the disease.

This condition presents the disease known as chronic (adherent or interstitial) salpingitis. It must be borne in mind that this condition is distinctly different from those forms of pure chronic ca-

FIG. 262.



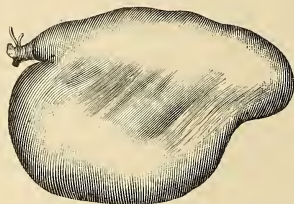
Chronic Interstitial Salpingitis and Ovaritis, with thickened broad ligament—so-called cellulitis.

tarrhal salpingitis in which the inflammation affects only the mucous lining of the tube, and results simply in a permanent alteration of that membrane, without particularly affecting the walls of the tube or its investing peritoneal covering.

Chronic interstitial salpingitis is nothing more or less than the mildest form of the same condition, which frequently progresses to the development of a pyosalpinx. If there be good drainage of the tube, there is not much danger of muco-purulent material accumulating. There may, it is true, be a certain amount of suppuration taking place, even the walls of the tube becoming involved. The result under these circumstances would be in accord-

ance with the patency of the tubal canal. If the canal remains patulous, the only additional harm will be the breaking down of the inflammatory products infiltrating the walls, and the consequent rendering of these friable, if they do not actually suppurate. This

FIG. 263.



Fallopian Tube and Ovary, showing adhesions.

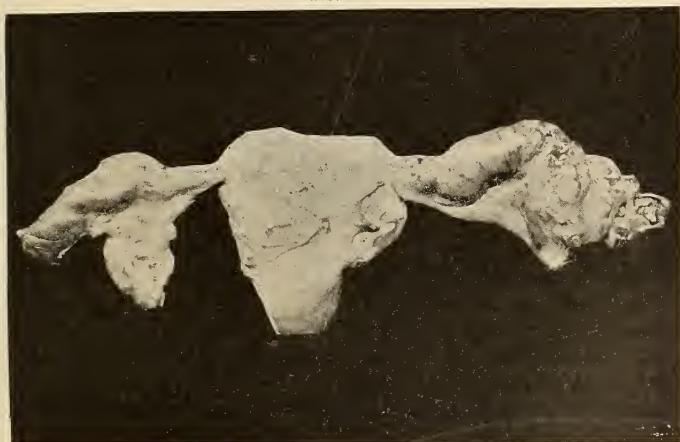
same process may extend into the lymph thrown out by the peritoneum, and cause the adhesions to become friable or even to suppurate.

Should suppuration occur, inflammatory products within the tube may drain away into the uterus, and the suppurative process finally cease, leaving the tube in its crippled adherent condition. The uterine opening will remain patulous long after the fimbriated opening is closed and the fimbria destroyed, for the reason that the peritoneum is much more delicate than the endometrium, and the irritation of the advancing suppuration will early cause it to throw out protective lymph, which will effectually seal the opening and protect the peritoneal cavity. The suppurative process may keep up indefinitely, the tube constantly discharging its muco-purulent contents into the uterine cavity and thence into the vagina. This is of no infrequent occurrence. The uterine opening may even become closed by light friable adhesions, the tube distend with its suppurative contents, until either the pressure of the over-distension causes the adhesions to give way or they break down from suppurative changes, the result in either case being a periodical discharge of pus from the tubes. The tubal openings usually become permanently closed by adhesions. If the tubal contents are small in quantity, they may eventually become absorbed; but this cannot be a common termination. It is not of infrequent occurrence to find the Fallopian tube distended with a broken-down, cheesy material. In these cases the watery elements of

the pus have been absorbed, and the solid portions have undergone a caseous degeneration. Such conditions are very apt to be due to tubercular changes. Were the constituent tissues of the tube healthy, there would be more probability of complete absorption. In the cases under consideration all the parts of the tube are so diseased and disorganized that their functions are for the most part suspended. However, certain cases are met with clinically in which no other interpretation is possible, and it may be put down as one of the probabilities.

When the contents are not absorbed, a true pyosalpinx results. The tube becomes distended with a greater or lesser quantity of pus

FIG. 264.

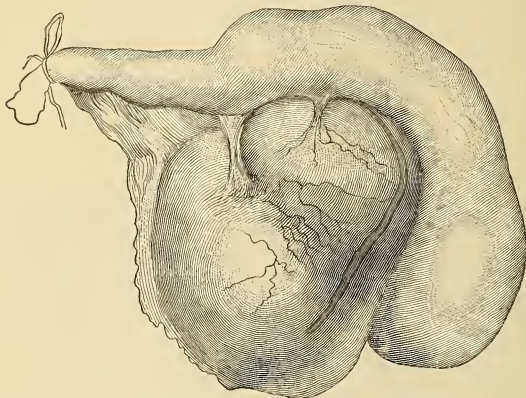


Double Pyosalpinx and Diseased Uterus, removed by Supravaginal Hysterectomy.

or muco-purulent matter. In such cases the inflammatory infiltrates in the tube-walls have most probably shared in the suppurative changes, rendering the walls soft and cheesy; the microscope will show them filled with pus-corpuscles. The peritoneal serum and lymph do not escape the suppurative changes. The pus may have worked its way directly through the tube-wall, and then infected the lymph, or the infection may have passed through the fimbriated opening of the tube, and in this manner contaminated the peritoneal elements. Small abscesses frequently result, in con-

sequence, in the midst of the adhesions, and on removal of the tube by abdominal section these abscesses, which are as often as not multiple, are opened, their contents soiling the field of operation. If the pus has passed directly through the tube-wall, these small

FIG. 265.



Pyosalpinx and Ovarian Abscess.

local abscesses will probably be the worst result. Should the infection pass out through the fimbriated opening, however, it may spread rapidly to the whole pelvic or abdominal cavity, and end in a general suppurative peritonitis. The reason of this difference is that when the suppuration extends through the tube-walls it never enters the general peritoneal cavity, but always meets the obstructing lymph which the peritoneum has had plenty of opportunity to throw out about the threatened point. This same obstruction is most always met with at the fimbriated opening, in which case the result is the same; but occasionally the infection itself travels along the tubal mucous membrane so quickly that it has time to escape before it can be closed in by the peritoneal lymph.

When the infection has once passed beyond the fimbriated opening of the Fallopian tube, it attacks either the ovary, the pelvic peritoneum, or both. Should it confine itself to the peritoneal investment of the ovary, it causes excretion of lymph, which binds that organ to the tube. The fimbriated end of the tube becomes



firmly attached to the ovary, not infrequently an abscess developing at the point of junction, which is known as a tubo-ovarian abscess. Should the infection penetrate the outer coat of the ovary or infect a ruptured Graafian follicle, there will begin and form in the ovarian stroma an abscess which may eventually reach even the size of an orange. Such an ovary is, as a matter of necessity, on account of the involvement of its peritoneal covering, densely adherent to all peritoneal surfaces which come in contact with it. Where there is no infection, but where the inflammation spreads from the tube and involves the ovary, this organ takes on changes of an interstitial character, which eventually cause such a destruction that there is little left of the healthy ovarian stroma. At times these organs assume much the character and appearance of hypertrophic scirrhus; at others, an atrophic condition. In either case the function of the organ is much changed, even destroyed, and the ovary is most likely to give rise to very distressing symptoms.

The infection may pass along the Fallopian tube and infect the ovary, even to the extent of forming an ovarian abscess, without leaving behind more than a catarrhal condition in the tube. When the infection invades the peritoneum, it remains often a local affection, but in a reasonably large proportion of cases spreads until it invades more or less the whole of the pelvic peritoneum. It may, in fact, continue and develop into a general abdominal peritonitis. In attacking the peritoneum any one of these forms of peritonitis are likely to develop: the fibrinous, the serous, or the suppurative. The fibrinous variety is by far the most frequent form accompanying inflammatory diseases of the Fallopian tubes and the ovaries. The serous variety is most likely to be of the nature of that peritonitis which so often follows the performance of a *cœliotomy*; it runs its course usually in three or four days, and most generally ends fatally. It may, as a matter of fact, occur under any source of infection. The lesions in such a case, on examination, will be found to be universal but light adhesions between all the coils of intestines located in the pelvic cavity, as well as of all the pelvic contents. After the various organs are separated a few ounces of bloody serum will be found in the pelvic basin, and the peritoneal surfaces will be observed to be covered with flakes of lymph. The process has been too rapid for the formation of pus in many instances, and as a rule there is not a great deal of involvement of underlying connective tissue. The



fibrinous variety is the common one. The irritated and inflamed serous membrane begins at once to develop that great protector, lymph. This material precedes the infection, and, unless the advancing inflammation is too rapid, bounds it within certain limits. Frequently it confines the inflammation to the serous covering of the tube itself. The inflammation may have advanced further and involved the serous covering of the ovary and the broad ligament.

As the inflammation advances step by step it is continually met by the obstructing plastic material which the threatened and irritated peritoneum is throwing out for its protection, until, having spent its forces, it makes less and less effort at advance, and finally settles down within the limits into which the lymph has been able to confine it.

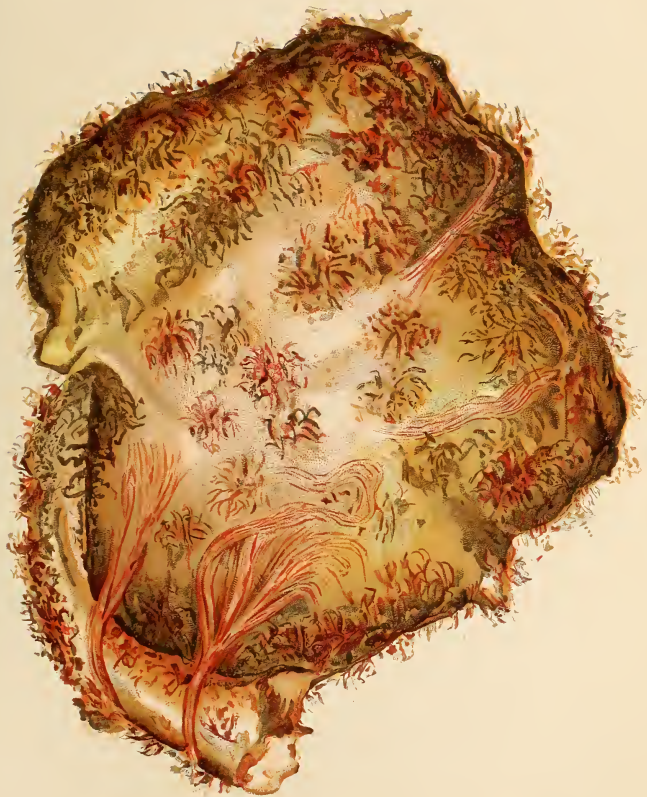
The extent of the destruction will have depended much upon the rapidity of the advance and the virulence of the infection. The lymph may have succeeded in confining it to the immediate neighborhood of the diseased Fallopian tube and ovary, or the inflammation may have spread to the whole of the pelvis, or in extreme cases to the general abdominal cavity. The inflamed peritoneal surfaces, wherever they come in contact, become glued together by the lymph. By the time the inflammatory forces have spent themselves, the serous membrane is infiltrated with the inflammatory products, resulting in its becoming thickened as well as being covered with lymph.

Should the case terminate in the most favorable manner, all the lymph and other inflammatory products would become partially absorbed, and the other parts return once more to a comparative condition of health. It is at this point that electricity has gained its greatest reputation. The lymph exists in considerable masses, and, as Nature begins to get rid of this accumulation, electricity comes in as an extra spur to hurry Nature's work. The result is in many cases a quicker absorption and an apparent cure, the facts being that the gross amount of lymph has disappeared, but the disorganized and adherent appendage remains, ready to relight the original inflammation upon the slightest provocation.

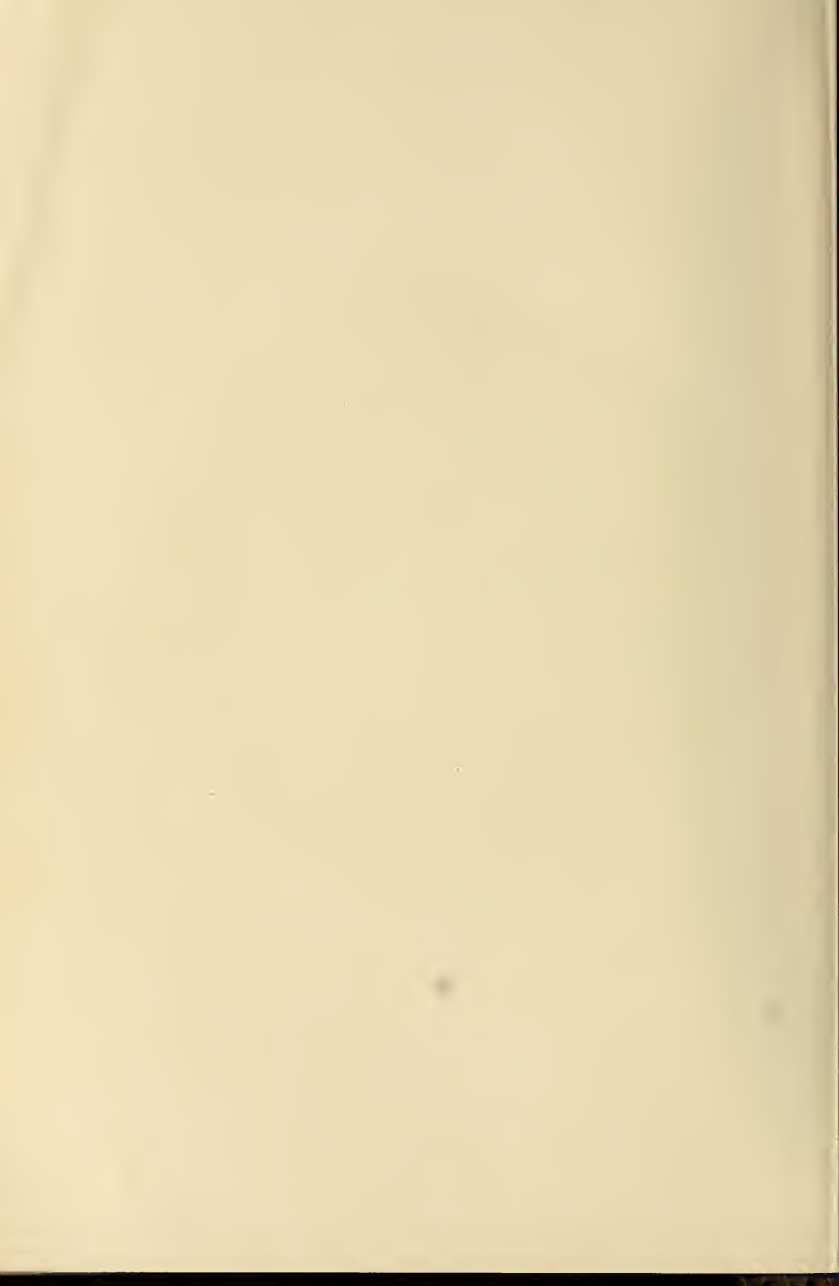
The fact is notorious that these chronic conditions are liable to repeated recurrent acute exacerbations of inflammation.

The more usual result, however, of such an inflammation of the pelvic peritoneum spreading from the Fallopian tube is to cause a broken-down and destroyed tube and ovary; both become enlarged,

PLATE XXVII.



Pyosalpinx and Ovarian Abscess, showing the remnants of universal adhesions.



heavy, prolapsed, and adherent to each other, the broad ligament, the uterus, and the pelvic walls. One step further, and the superimposed intestines and omentum are involved, and become adherent on top of the diseased and adherent pelvic organs. At times there is no pus complicating the general destruction; at others pus is found in the Fallopian tubes, the ovaries, in the midst of the adhesions in which these organs are imbedded, or filling the whole pelvis. The Fallopian tubes themselves are so distorted that numerous separate pockets of pus are found in a single tube. As many as three such collections have been found in the same tube, each of

FIG. 266.



Broad thin Band of Adhesions (spider-web) hanging from an Adherent Ovary and Fallopian Tube.  
(Drawn from photograph.)

which contained a distinctly different variety of pus. As many as half a dozen different foci of suppuration have been found in the midst of the adhesions, and in a single Fallopian tube, all separate and unconnected with one another.

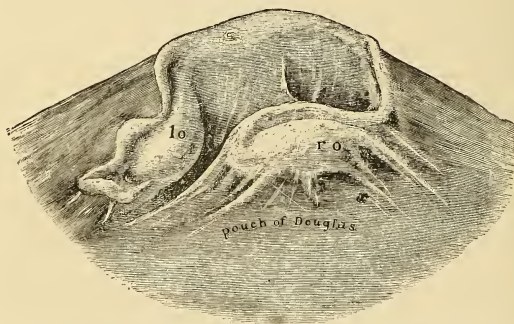
Should the infection not be virulent enough to cause suppura-

tion of the serum and lymph, this latter substance will undergo organization to a greater or less extent, with the result of leaving the surfaces which have come in contact permanently adherent. The adhesions thus found are variable in kind; clinically at least four varieties are recognized.

The Fallopian tubes, ovaries, and uterus, one or all, may be covered with a thin layer of false membrane, well organized and not at all unlike a spider-web, when spread out and held up to the light. The variety has well been called the "spider-web adhesion." The membrane is easily torn to pieces and destroyed if the finger is pressed through it while it is on the stretch. If, in attempting to break through, it is allowed to gather itself together like a bundle of sticks, it forms long shreds of adhesions which are exceedingly hard to tear, and in the tearing of which an intestine or bladder may easily be injured badly, its walls giving way at the point of the adhesions. They are the more difficult to deal with inasmuch as the organs are usually movable under them, and it is hard to get any fixed point from which to break through.

The next variety is that where any or all of the pelvic organs become fixed in the lymph in much the same manner as if they

FIG. 267.



Ovary Displaced and bound Down in the *Cul-de-sac* by Adhesions—adhesions of the spider-web variety, similar to those shown in Fig. 266: *ro*, right ovary; *lo*, left ovary.

were set down in a bed of plaster of Paris. The lymph organizes and from it is formed a new and apparently real peritoneal covering. Clinically, to the touch, the organ feels as though it had been congenitally developed in its displaced and distorted position. In

the case of the ovary the ovarian ligament is destroyed; where the Fallopian tube is involved the broad ligament has, to a greater or lesser extent, disappeared. The organs are immovably fixed, and can only be torn away from their position by an absolute enucleation, there being practically no pedicles to deal with: to all intents, the mass removed is a sessile growth, and must be dealt with as such. The cases in which this condition is found are usually old chronic ones.

The ordinary adhesion met with in the course of operations is what one might call the "bread-and-butter" variety. After the adherent surfaces have been freed from each other the appearance is not unlike the surface of two pieces of bread and butter which have been placed together as in a sandwich and separated. These adhesions are more or less firm as the case is an acute or chronic one. At times they are so solid that it is necessary to take the handle of the scalpel or other instrument in order that they may safely be separated; in other cases the finger will readily destroy them. Should the lymph going to form these adhesions become infected, they become more or less broken down, and are proportionately easy to deal with. This forms the fourth variety as seen clinically. Naturally, the only pathological difference between at least the last three varieties is the difference in the extent of involvement and organization. They all begin by the affected organs becoming imbedded in a quantity of plastic lymph. This lymph organizes or is partially broken down by the infectious poison. If it breaks down and fails to organize, the last clinical variety is produced. This variety usually accompanies acute pus-tubes. Should it fail to do more than make an attempt at organization, the adhesions will go to make up that variety which is the most common, the "bread-and-butter" variety, which generally accompanies chronic (adherent or interstitial) salpingitis. It is almost always possible in enucleating the organs in such a case to find the broad and ovarian ligaments and use them as a pedicle, although at times they are much shortened. If the case runs on into a chronic form, either of the last two varieties may develop, by absorption of the degenerative elements and by organization and contraction, into those varieties which resemble so much congenital conditions.

Finally, the lymph may break down into suppurating foci at one or more points, local abscesses being the result. These abscesses, being bounded by adherent lymph, are for all practical purposes



extraperitoneal, and yet they are as truly, from an anatomical point of view, intraperitoneal as if they were not limited at all. As a matter of fact, they exist from cavities as large as a pea to abscesses filling the whole of the pelvis, and only being shut out from the general abdominal cavity by the intestines and omentum at the pelvic brim, becoming involved in the advancing inflammation, lymph being thrown out, and these organs becoming firmly adherent over and about the pelvic inlet.

Unless the attack has been a mild one, the connective tissue immediately underlying the peritoneum is apt to become involved in the destruction. So intimately connected are the two structures that where the one is affected by such a serious process it can readily be understood why the other also becomes involved. As soon as this loose areolar tissue is invaded, the products of inflammation are thrown out into its meshes, and the parts affected become much thickened. The connective tissue of the broad ligament and that underlying the peritoneum which lines the pelvic floor are most apt to be affected. The infiltration, as usual up to a certain point, attempts to undergo organization, but mostly fails. It is either absorbed or suppurates.

Should it become absorbed, it would do so in conjunction with the absorption of the inflammatory products in the peritoneum and in the line of progress toward the cure of the whole pelvic inflammation. If organization partially occurs, a contraction of all the tissues takes place, with the result in some cases of almost total obliteration of the ligaments and contained connective tissue. This is the condition which has existed in those cases of prolapsed and adherent tubes and ovaries, where the ligaments have almost, if not entirely, disappeared and the organs remain practically as sessile masses. Cellulitis is essentially an acute or subacute as well as a secondary disease. It rarely occurs in the pelvis as a primary disease, and is just as rarely found as a chronic condition, except in the form of an abscess; which is not common. The abscesses and masses in the pelvis formerly looked upon as cellulitis are almost without exception contained within the peritoneal cavity; where the abscess does exist in the cellular tissue, it is generally an extension from a focus of suppuration in the peritoneum. It is said that in acute puerperal cases the infection, at times, extends by way of the lymphatics directly into the cellular tissue, and results in the formation of a true cellulitis and a true primary cellular-

tissue abscess. Examples of such cases have from time to time been placed on record by reliable authorities, but they must be of exceedingly rare occurrence, as the writer during the course of many hundreds of *cœliotomies* has failed to find a single example of the condition. In no case, except in suppurating cysts, has a pelvic abscess been observed which was not intraperitoneal, in the sense that it had originally developed in the peritoneal cavity.

These pelvic abscesses, whether of peritoneal or cellulitic origin, are extremely apt to burrow their way to the surface and discharge their contents in a more or less irregular manner. They have been known to empty themselves into the rectum, vagina, and bladder. The umbilicus, the saphenous opening, the pelvic floor, the labia, the pelvic foramina, have all served as means of passage for the pus. Cases have even been reported where the pus has burrowed through the connective tissue to the iliac fossa, and from thence to the diaphragm, finally rupturing into the lung. The spontaneous evacuation of pus by any of these sources, although a proportion of such cases go on to a good recovery, is a disaster, and the danger of such a result is one of the clearest of indications for the adoption of vigorous measures to ensure its prevention. The usual course of a case after such a mishap is a prolonged convalescence—just as commonly a long invalidism, followed by death. The sinus-tracks are long and irregular, and the abscess-cavities very incompletely drained. In the case of the rectum and the bladder the cavity is continually contaminated by the contents of these organs, and an already bad condition is rendered worse.

**SYMPTOMS.**—These vary in accordance with the anatomical parts attacked and the intensity of the inflammation.

The amount of suffering incurred by the patient will vary from a matter of slight discomfort to agony which is quite beyond description. There is no death from which a woman may die which is, in all its features, more distressing than a death from peritonitis, especially an acute septic peritonitis. The symptoms of each of the parts attacked are in many respects similar. The involvement of almost all the tissues of the pelvis follows as a complication wherever the brunt of the attack may fall. In other words, one tissue is seldom involved without all being more or less included; consequently the symptoms which would be induced by the attack of one tissue are present at the same time with those

which would be induced by the involvement of any or all the other tissues.

There are three symptoms which are present in greater or lesser degree in almost, if not quite, all cases of pelvic inflammation. Pain, hemorrhage, and uterine discharges usually dominate all other factors in cases in which suppuration has not supervened. Naturally, the temperature and pulse play a conspicuous part. When suppuration occurs, all the symptoms of septicemia are added to those already existing. In addition, symptoms referable to special organs and due most frequently to sympathy and reflex influences become at times prominent.

*Salpingitis.*—In acute or chronic catarrhal salpingitis the symptoms are seldom sufficiently prominent to give rise to any suspicion that there is such a disease present. In the acute form the patient will most probably feel a condition of general malaise, have some backache, with a possible headache; there may be a slight increase of the discharge coming from the vagina. No noticeable change takes place in the menstrual function, for the reason that this is already, in all probability, disordered from a pre-existing endometritis, and the lesion in the tube is too slight to add anything perceptible to the result. If at this time the temperature and pulse should be taken, the one would be slightly elevated, the other accelerated. No doubt in every acute case these symptoms are present to a greater or lesser degree, but in almost every instance the attack is so slight that it is passed over without notice, and the disease has soon settled itself down into a subacute or chronic form: in this condition the symptomatology is even slighter than in the acute form. The disease is so constantly associated with endometritis, being, as a matter of fact, almost always an extension of the uterine inflammation, that the symptoms of the primary disease are a great factor in obscuring those of the salpingitis. The fact that the disease has existed at all is usually only discovered when its results are made manifest. It is from this form of the pelvic inflammation that hydrosalpinx arises.

*Hydrosalpinx.*—The distension of the Fallopian tube with serum frequently exists without giving rise to any symptoms whatever. If the resulting tumor is not very large—and usually it does not reach a size greater than that of a Messina orange, although occasional cases are reported of enormous size—there is no particular reason that it should cause any disturbance. When it does so, it

will most generally be found that an inflammation, slight or otherwise, has invaded the peritoneum, and that whatever symptoms are present will be due in great part to the local peritonitis. Adhesions may result or not, this being determined by the character of the peritonitis. Should inflammation of the serous membrane complicate the case, it will give rise to pain, either slight or quite severe according to the grade of inflammation and the extent of the adhesions. Leucorrheal discharges are apt to enter as a factor into the case: the discharge is of a whitish character, and seldom if ever assumes a muco-purulent form. Should the discharge be muco-purulent, it is evident that it originates from the endometrial inflammation, and is not merely due to the congestion caused by slight local peritonitis. Menstrual disturbance is apt to be present, as is the case with most examples of pelvic inflammation; the flow is apt to occur too frequently and to be profuse.

*Hematosalpinx*.—Should the exudate from the mucous membrane of the Fallopian tubes take on a bloody character and the openings of the tube become occluded, the result is an hematosalpinx. The symptoms of this disease differ in no way from those of the hydrosalpinx, or those of the adherent or interstitial salpingitis which will be described later. As in the latter disease, the greatest amount of its symptomatology is derived from the peritoneal involvement, and, as the extension of the inflammation to the serous membrane is of about equal occurrence in both, the symptoms are usually the same.

*Interstitial Salpingitis and Ovaritis*.—The name is given this form of pelvic inflammation for want of a better one by which to designate it. It is meant to include all forms of inflammation of the Fallopian tubes and ovaries, excepting those mild ones described under the name of catarrhal salpingitis and those described under tubercular salpingitis. Leucorrheal discharge will be the first indication of the trouble, and this will quickly be followed by pain. The vaginitis and endometritis which precede the salpingitis will have been ushered in with muco-purulent discharges. These discharges continue when the Fallopian tube becomes involved, and the only difference then to be noted is that there is added to them the discharges from the tubes. This addition is not sufficient under ordinary circumstances to be perceptible. Should the tubal discharges accumulate and distend the tube, it not infrequently occurs that the obstruction at the uterine end finally gives way, and there is consequently a gush of muco-purulent matter from

the uterus and vagina. One must be on his guard, however, against this symptom as indicative of an over-distension of the tube and its spontaneous discharge into the uterus. This is presumed to be one of the methods Nature has of curing pyosalpinx, and one which, if we are to believe all the reports in the literature on this subject, is extremely common. There is no doubt but that such a happy termination does occur in some few cases, but their frequency is questionable. The symptom oftentimes only exists in the mind of the attendant and the patient, and is due for the most part to faulty observation. Some slight temporary obstruction arises in the cervical canal, and the discharges accumulate in the uterus, only to be expelled as the patient assumes a favorable position; or, what is more common, there is an accumulation in the posterior cul-de-sac of the vagina, with a subsequent discharge on certain movements of the woman favorable to their expulsion. The symptom is most apt to occur in women who are confined to bed, the recumbent position favoring such a condition. Leucorrhœal discharges are common to all inflammatory or congestive conditions of any or all of the pelvic organs. They are therefore not at all diagnostic, and are only of value as corroborative evidence. Their character varies as they are mixed or not with infection. The purely congestive discharges—such, for example, as precede menstruation and accompany pregnancy—are of a milky-white character; those which accompany gonorrhœal infection or puerperal septicemia assume a muco-purulent character. It is this latter kind of discharge which almost always accompanies interstitial salpingitis. As a matter of fact, it is a combination of the excretions of the tubes, uterus, and vagina, and is made up of the suppurating inflammatory effusions, mucous and epithelial cells. The discharge is frequently acrid, and causes a pruritus of the vulva. Pruritus is not so common a symptom in these inflammatory diseases as we would be led to imagine from the amount of the discharges, their acidity, and the constancy with which they exist. So infrequently does it occur, in fact, that a grave doubt arises as to whether the pruritus is ever due to the discharge. Leucorrhœa is as apt to appear in the same amount where the inflammation has attacked the tube alone as where the whole pelvic peritoneum is involved.

Pain is a constant companion of the pelvic inflammatory diseases. It varies in intensity with the tissues involved and the extent of the process. In cases of adherent salpingitis and ovaritis it is



usually located in one or both iliac regions, at times extending down the thighs, and is frequently accompanied by backache. It is severe or not as the attack is an acute or chronic one. Its character is variable, from a dull, heavy backache to a sharp, lancinating iliac pain, which does not come and go, but remains, for the most part, constant. Often it is due more to the irritation of the advancing inflammation than to any real involvement of the tubal or ovarian tissues. It is no infrequent thing in gonorrheal or puerperal endometritis to find that the iliac pain disappears after a thorough curettement of the uterus, proving that the inflammation has not yet passed beyond the uterine cavity. The sharp pains are mostly due to peritoneal involvement, and are a fairly sure indication that this membrane has been invaded by the actual inflammation, or at least is irritated by its near approach. The ovarian involvement is, however, responsible for a fair share of the condition. The dull, heavy pains, as the backache, are most probably produced by the infiltration of all the tissues with inflammatory products; possibly some of the elements of the peritoneal pain are added as a factor. Motion or pressure of any kind will aggravate this symptom. An over-distended bowel or bladder gives more or less distress, and the contraction incident to the emptying of either of them causes considerable suffering. Walking, riding, or jarring from any cause calls forth this complaint: even the erect position may be uncomfortable or unbearable.

Menstrual disturbances are universal. As a rule, menstruation appears too frequently, every two or every three weeks, and lasts from the usual time to eight or ten days: occasional cases last for so long as two weeks. It is important in weighing this symptom to inquire carefully into the past menstrual history. Not uncommonly, women present themselves for treatment in whom a frequent and prolonged menstruation is natural, and this condition must not be confounded with a pathological one. Where the flow has formerly been fluid, under the altered condition it is apt to become clotted and dark. The function is accompanied by pain, which may appear some days before the flow and last several days after it has ceased. Like all the other symptoms, this one is variable, and in not a few cases the flow is scant rather than profuse. Scanty menstruation is the exception in inflammatory diseases of the Fallopian tubes, but that it does exist is undoubted. Suppuration of the exudates and an accumulation of pus in the tubes have no very



perceptible influence upon these symptoms. Pain, hemorrhage, and leucorrheal discharges seem to depend largely upon the amount and character of the involvement of the serous membrane; certainly pain is almost absolutely dominated by this factor; possibly the altered mucous membranes have the most influence upon the other two symptoms. The three symptoms grouped together in conjunction, with a history of gonorrheal infection or of post-puerperal septicemia, are highly suggestive, and yet not much reliance can be placed on a diagnosis based upon this data. The three symptoms, alone or grouped together, accompany almost every disease to which the pelvic organs of the female are heir. These symptoms, however, taken in conjunction with certain local conditions, establish the diagnosis almost certainly.

As in all inflammations, the temperature and pulse are affected. Usually neither of them rises to any very great extent. During the first few days of the acute attack they may both be elevated considerably above 100°. As seen in the subacute or chronic condition, it is rather uncommon to note any great deviation from the normal where suppuration has not occurred or where the peritoneum is only slightly or not at all involved. If the attack has been ushered in with a chill or rigor, it is almost certain that either one of these two conditions exists. As a matter of fact, peritonitis and cellulitis almost always accompany and complicate the salpingitis, and consequently the symptoms of the two conditions always commingle.

The tendency of inflammation near or about the bowel is to inhibit peristaltic action, and constipation is the rule. As constipation is almost the natural condition of women, however, it adds little to our diagnostic resources. On the other hand, the bladder becomes irritable under the same condition, and the presence of the urine causes a frequent desire of the bladder to empty itself. Frequent micturition and constipation are common symptoms. Any irritation in the pelvis seems to give rise to gastric disturbances, and the inflammatory diseases are no exception. Symptoms of dyspepsia, especially flatulence, are very common, and, in fact, at times give rise to more distress than the symptoms referable more directly to the pelvic lesions. Distension of the intestines with gas occasions considerable pain at times—a pain which comes and goes, and which is distinctly different from the inflammatory pains.

*Pyosalpinx and Ovarian Abscess.*—Should the inflammation progress to suppuration, many of the symptoms are apt to become exag-

gerated, and in addition there is added the condition of sepsis. The woman begins to suffer from cold creeps, chills, or even a rigor; the temperature becomes elevated, ranging from  $100^{\circ}$  to  $104^{\circ}$ , or even higher; the pulse rises rapidly, and varies from 100 to 140 or more beats to the minute. The abdomen becomes swollen, due to distension by gas, the walls hard, unyielding, and exceedingly tender to the touch. The skin surface may become cold and clammy, the appetite destroyed, the sleep restless and unrefreshing. A general feeling and appearance of dulness, or even stupor, may supervene. The pain is more persistent and intensified, and is apt to assume a more or less deep, throbbing character. As time passes the woman's general condition gradually grows more and more serious. She loses many pounds of flesh and becomes greatly emaciated; her face has a distressed and shrunken appearance; her nervous system becomes shattered; she may or may not be confined to her bed. It might easily be concluded from these remarks that no great reliance could be placed upon symptomatology in the diagnosis of inflammatory tubal disease. Such is, in truth, the fact. It is absolutely necessary that the physical signs be determined by vaginal examination before the truth can be ascertained.

*Peritonitis.*—The symptoms attributable to this disease are a combination of those produced by the inflammation of all the other parts of the pelvis. As a matter of fact, the main symptoms attributable to pelvic inflammatory cases are produced by the inflammation of the serous membrane. Many of the symptoms described under different forms of salpingitis originate in or are increased by the peritonitis. Inasmuch as peritonitis to a greater or lesser extent complicates the inflammations of the Fallopian tube, the symptoms are practically the same, their severity depending much upon the extent of the lesion. If only the peritoneum covering the Fallopian tube be involved, then the symptoms will be similar to those already described. When the whole pelvic peritoneum is invaded, the pain is more acute; the temperature and pulse are more markedly elevated; the patient lies more comfortably with the knees drawn up, for the reason that it relaxes the abdominal muscle and takes away a considerable amount of the intra-abdominal pressure; the expression of the face is apt to be distressed; the abdominal muscles rigid and fixed; the whole abdomen tender to the touch; the intestines distended with gases, rendering the belly tympanitic; the appetite abolished and sleep impossible. Consti-

pation is absolute and there are eructations from the stomach. Such is a fairly typical description of a severe attack of pelvic peritonitis. There are, in addition, all the symptoms present which have been enumerated as accompanying inflammation of the Fallopian tube, together with those present when the cellular tissue is involved; which is generally the case. Should suppuration of the exudates occur, there will be added the symptoms of septicemia. The difference of these symptoms from those arising in a suppurating salpingitis will be more of degree than of kind. In the abscess forming in the abdominal cavity, either as a small pocket in the midst of the lymph or as a general abscess of the whole pelvic cavity, the absorption is apt to be more rapid than if confined to the Fallopian tube.

*Cellulitis.*—The symptoms attributable to this disease are indistinguishable from those of peritonitis. The two affections go hand in hand, and any attempt to classify their symptoms would only be theoretical. As a matter of fact, they cannot be distinguished clinically. A simple infiltration of the cellular tissue with inflammatory products would produce no other symptom than possibly a feeling of weight and fulness, but this discomfort would be so overshadowed by the severe suffering from the peritonitis as hardly to be noticed. In those rare cases in which primary abscesses occur in the cellular tissue, following or accompanying the puerperium, nothing distinctive is noticed until suppuration occurs, and then the symptoms are simply those of septicemia. An attempt to classify and compare, for differential purposes, the symptoms of cellulitis and peritonitis is of no more than problematic value; it is of no practical benefit. Clinically, the two affections are indistinguishable, for the reason that they always complicate each other, and their symptoms are so closely interwoven. The symptoms of cellulitis, which is mostly secondary, are few and unimportant and are completely overshadowed by the far more important and severe symptoms of the peritonitis, the primary disease.

*PHYSICAL SIGNS.*—In an attack of pelvic inflammation there is always a fairly regular routine followed, and the results are essentially the same, differing only in degree. Every case is in this respect a law unto itself, and in no two of them are the Fallopian tubes and ovaries equally degenerated and distended, nor are they always found in the same position. The physical signs are so

closely interwoven that all the elements must be considered together if they are to be viewed to the best advantage.

*Catarrhal Salpingitis*.—Physical signs are entirely absent. There is no infiltration of the tube-walls, and no peritonitis or cellulitis, with attendant exudate of lymph and infiltration of inflammatory products. The Fallopian tube is almost, if not entirely, as soft as in its normal condition, and if there is any enlargement it is simply due to a mild congestion. For practical purposes it may be considered that in the average woman of ordinary size the Fallopian tube cannot be palpated. Such may be said to be the case also in catarrhal salpingitis.

*Hydrosalpinx*.—In this form of the disease the uterus may or may not be freely movable. Most frequently it is movable, as the Fallopian tube is either not adherent or so lightly so as not to affect the womb. The mobility of the uterus in health varies so much that it is often difficult to decide whether or not it is impaired. More frequently, both Fallopian tubes are involved, although it is no unusual thing to find only one side affected. By deep palpation to the sides of the womb a cystic tumor, varying in size and shape, will be felt. The tumor is elongated, and can be traced with the finger from the side of the pelvis to the uterine cornua. It is distinctly felt to be free from the uterus and independent of that organ. Usually, a sulcus can be recognized between the two. The examination may simply disclose a large cystic tumor with nothing characteristic about it; in either case the growth may be fixed by adhesions and rendered immovable, or it may readily be displaced in any direction. The opposite side may be found in the same condition, or the examination may disclose nothing as regards its involvement. It is often found in a state of simple catarrhal salpingitis.

Very much the same can be said in regard to that phase of the disease in which the tube is distended with blood, as has been said of hydrosalpinx. *Hematosalpinx* has no distinguishing features. It differs from hydrosalpinx only in that it is apt to be smaller, with thicker walls, and more likely to be adherent, and consequently immovable. The affection is most usually unilateral, and is often complicated on the opposite side by an interstitial salpingitis.

When the walls of the Fallopian tube are infiltrated with inflammatory products and its peritoneal covering involved, an

examination of the pelvis will reveal a condition depending upon the severity of the attack and the extent of its advance. The uterus will be found to a greater or lesser extent immovable, as well as enlarged. It will be adherent in a displaced position or not, depending upon its location in the pelvis at the time of the attack of inflammation. In the milder attacks the Fallopian tubes will be easily felt to the sides of the womb as hard, elongated cords, adherent, immovable, and extremely painful to the touch. The organ can readily be traced to the uterine cornua, and a sulcus may be felt between the two. The ovaries will be found about halfway between the pelvic wall and the uterus on either side, enlarged, hard, and adherent. The size of the tube and ovary, as well as that of the uterus, will depend upon the amount of involvement of the cellular tissue, but more particularly upon the extent of involvement of the peritoneum and the amount of lymph thrown out. A Fallopian tube and ovary which together appear *in situ* to be as large as a four-ounce bottle will not infrequently be found, on removal, not more than two or three times the natural size: the remainder of the bulk is found to have been made up of plastic lymph, which is to a great extent destroyed as the adhesions are broken up. The size of the womb is at times also more apparent than real, the enlargement being due also to the surrounding lymph. For the most part, however, the womb is actually enlarged by the inflammatory infiltrate into its walls, brought about by the primary endometritis. As often as not the uterine appendages are displaced, and may be found in any part of the pelvis. Both tubes and both ovaries have been observed on the same side, the one ovary being displaced in some manner, and found directly adherent on top of the opposite one. Not infrequently, when the uterus is retrodisplaced, either one or both appendages will be found posterior to this organ, and so high up as to be out of reach; they are consequently often overlooked. The disease is generally bilateral, and the same condition can be felt on both sides; at times, however, it is only unilateral. When there is acute involvement of the whole of the peritoneum on the floor of the pelvis, as well as of the connective tissue underlying it, a sensation of fulness in all directions will be felt, its hardness depending upon the amount of infiltration and the chronicity of the case.

Should the tubes and ovaries be distended with pus, they will be found on palpation in much the same condition as that just



described. If the pus be present in considerable quantities, the masses may fluctuate or give to the touch a sensation of softness, and in very exceptional cases may feel not unlike ordinary cysts. Should small abscesses exist in the lymph or connective tissue surrounding the uterine appendages, they cannot be detected. When these intraperitoneal abscesses extend and involve a considerable part of the pelvis, advancing even into the connective tissue, the whole pelvic vault conveys a hard, board-like feeling to the examining finger—a condition which extends as far as the finger in the vagina can explore. It is not uncommon to find an infiltrating ring higher up about the rectum. This ring is due to connective-tissue infiltration, and does not usually break down into suppuration. Through the abdominal walls a hard mass of no definite shape or consistency can at times be felt, which is made up for the most part by adherent intestines and omentum. Ordinarily, the infiltrating masses cannot be felt through the abdominal walls except with the patient under the influence of ether: only in cases of pelvic abscess do these large irregular masses rise into the abdominal cavity high enough to be felt readily by abdominal palpation.

**DIAGNOSIS.**—The establishment of the diagnosis of pelvic inflammation is difficult or not according to the stage at which the disease has advanced and according to the virulence of the infection.

*Catarrhal Salpingitis.*—It is not possible to diagnose this form of disease except by inference. Symptoms are so slight as not particularly to call the patient's attention to her pelvic organs unless she is already suffering from endometrial disease; in this case the symptoms caused by the infection of the uterine cavity will so greatly overshadow all those of the salpingitis that she will have no cause even to suspect that her Fallopian tubes are becoming involved. Even should the disease be suspected, there is no way in which the suspicion can be verified, for the reason that the Fallopian tube can only be palpated in exceptional cases, and even should it be felt, the changes in its tissue are so slight that they could not be distinguished by the touch. Later on, when sterility is demonstrated or a hydrosalpinx is discovered, the relation of cause and effect may be seen. The sterility may, however, be caused by intra-uterine disease, in which case, until the specimen is actually under the microscope, it is not always possible to make the



diagnosis, even by inference. An element of doubt would exist under the most favorable circumstances, rendering speculation or theory absolutely useless for practical purposes.

*Hydrosalpinx*.—It is always possible to come to the conclusion in this phase of the disease that there is present in the pelvis a tumor which does not belong there. It may even be possible in some cases to say positively that this form of the disease exists. Theoretically nothing should be easier, but practically many elements combine to defeat the desired result. The tumor caused by a hydrosalpinx is mostly unilateral, and will be found in the position which should be occupied by the Fallopian tube and ovary. If a tumor be found in this position and its character be doubtful, an examination with the patient under ether will often clear up the doubtful points. The walls of this neoplasm are thin and the tumor fluctuates. The amount of fluctuation will depend largely upon the size of the growth, the consequent thinness of its walls, and upon the number and density of its adhesions. At times it is entirely free from adhesions, and is as freely movable, within the limits of the mobility of the Fallopian tube, as would be an ovarian cyst. Should the tumor be a large one, it will assume a rounded shape not unlike a cystic ovary. On the other hand, when the tubal distension is limited, the resulting tumor will retain the elongated, tortuous shape of the Fallopian tube. The principal diseases that may be mistaken for this condition are small ovarian cysts, small parovarian cysts, hematosalpinx, and extra-uterine pregnancy. In hydrosalpinx the main features in the diagnosis are the elongated, sausage-like shape of the tumor; the fact that it can be traced to the uterine cornua at the position where the tube would naturally be found; the presence of the ovary independent of the tumor; and the fact that it is a cystic growth. The ovarian cyst is always rounded in shape, and there is no connection whatever between it and the uterus. The parovarian cyst is apt to be much less movable, and never has the elongated shape of the hydrosalpinx; neither has it any connection with the uterus such as described.

It is not possible to distinguish hematosalpinx by the physical signs, and the symptomatology is too unreliable to be trusted. The fact that the blood-tumor is more liable to be adherent is not sufficiently practical to be of much benefit. Extra-uterine pregnancy can generally be distinguished by its symptomatology and by watching its behavior as it grows. It is probable that more frequent mis-

takes will be made in the case of small parovarian cysts than anything else. After all has been said, failure oftener than success results in an attempt to diagnose hydrosalpinx.

*Hematosalpinx.*—What has been said in the case of hydrosalpinx is equally true of this disease. The same characteristics of the tumor exist, excepting that the hematosalpinx is not apt to become so large. However, as there are many cases of small hydrosalpinx, this point has no particular value. The tumor is elongated; it is connected at the uterine cornua, as is the case with the normal Fallopian tube; it fluctuates more or less satisfactorily; if the distension be only slight, this sign is worthless. The question of adhesions is also of dubious advantage, as any of the products of pelvic inflammation are almost certain to be adherent. The one sign which may be of advantage in the diagnosis of either hematosalpinx or hydrosalpinx is the division of the elongated tumor into compartments, or an apparent attempt in this direction. The healthy Fallopian tube is so divided, and it is frequently the case that a tube distended by fluid contents has two or more compartments. These can at times be appreciated by the touch, and in case they are a diagnosis can probably be arrived at.

*Interstitial Salpingitis and Ovaritis.*—Nothing is more deceptive than the symptomatology in pelvic inflammations. A woman may present herself complaining of all the symptoms of diseased, disorganized appendages, and yet an examination fail to establish such a diagnosis. A patient may give a history of having been married for some years and of having had one or more children. She has remained in good health until in her last confinement or miscarriage, when she has had septic trouble, indicated by a swollen and painful abdomen, together with fever; or her trouble may have begun with a well-marked attack of gonorrhea. From this time until she consults her physician she is not in good health. Pain is a constant companion, being referred to the iliac regions or the back. There is pain on coitus, defecation, riding in the cars, walking, or sitting down, and under any circumstances which will cause a displacement of the pelvic organs. The menstrual function, which was originally normal, is now profuse and irregular. Muco-purulent discharges exist; the patient suffers from chilly feelings at times, and loses flesh. The history in such a case is complete, and if the symptoms alone are depended upon to make the diagnosis, the most skilled physician will probably be often led astray. Such patients

continually report themselves, and a bimanual examination even under ether fails to confirm a diagnosis of pyosalpinx or of chronic interstitial salpingitis, although the entire pelvis may be exquisitely tender to the touch. In such cases, where the abdomen has been opened for exploration, the peritoneum and cellular tissues have frequently been found to be healthy, as far so a macroscopical examination could determine. It is altogether unjustifiable to send a patient to the operating-room, presumably suffering from the results of pelvic inflammation, without first having made a thorough and searching examination of the pelvic organs by bimanual palpation; and if there is any doubt as to the existence of any lesion, the examination should be made with the patient under ether. The combination of the symptomatology and physical signs will generally succeed in establishing a correct diagnosis in these diseases. However, unless one of the Fallopian tubes or ovaries can be palpated, and plainly demonstrated as being enlarged and diseased, the diagnosis cannot be said to have been established. The symptoms can generally be traced to a labor, a miscarriage, or an attack of gonorrhea. A very large number of the patients have had an "inflammation in the stomach," or give a history of having had typhoid or malarial fever in or following the puerperium; their symptoms have dated from or about this time; sterility is a prominent and constant feature. The principal indications of the underlying trouble are the pain and the disordered menstrual function, and not infrequently there is a history of one or more attacks of peritonitis. A vaginal examination usually discloses an adherent and more or less immovable uterus. In a goodly number of cases, however, the uterus will not be found fixed, but movable within certain limits. An attempt to displace the womb will elicit pain, whether it be adherent or not, the pain being caused for the most part by the dragging upon adhesions, either those involving the uterus or those encircling the Fallopian tube and ovaries. The pain will be greater or lesser in proportion as the inflammation about the parts has subsided.

To the right or left on both sides of the womb the Fallopian tubes and ovaries may be felt. The tubes are enlarged, thickened, and adherent. Attempts at displacing them result simply in causing pain; the whole pelvic vault is tender when the inflammation has not subsided. The Fallopian tubes will be felt as elongated, tortuous bodies in the position of the normal organs, extending from the

side of the pelvis to the uterine cornua. In some cases the ovary, from the fact that it is prolapsed to a lower level than that of the tube, forms the greater bulk of the mass presented to the examining finger; slightly deeper palpation will, however, usually disclose the elongated tube. Occasionally it happens that the uterus is retro-displaced, and the appendages are one or both of them twisted posterior to the fundus, and, unless the patient is under the influence of ether, cannot be distinguished. So closely attached are the appendages at times to the womb that the whole mass appears as one body, and it is only by the irregularity of the mass and the existence of a sulcus between the diseased appendage and the womb that the true condition can be distinguished. An examination by the rectum which permits of the examining finger being passed posterior to and above the uterus and broad ligaments will often decide these points, where no definite conclusion could be arrived at by the combined vaginal and abdominal touch. In the acute condition, where the appendages are surrounded by and buried in masses of peritoneal lymph and the cellular tissue is involved, they will appear to be of great or indefinite size. The whole vaginal vault may be so hard and board-like that it will be impossible to distinguish the appendages through the general mass of lymph. In the more chronic form, when the lymph and cellular exudate have in great part been absorbed, the tube may present itself only as large in diameter as an ordinary lead pencil. It is not very probable that there will be a failure to diagnose the disease, excepting where it has undergone suppuration and assumes more or less the character of a cyst. These enlarged and thickened tubes and ovaries, densely adherent and often surrounded by masses of peritoneal lymph and cellular exudates, taken together with the history and symptoms, can hardly be misunderstood. There are few conditions for which this disease is likely to be mistaken.

Every woman suffering with the lesions of a pelvic inflammation is liable from time to time to have the inflammation recur. Frequently the inflammation never leaves the parts, but remains as a low-grade chronic disease, ready to relight into an acute exacerbation on the slightest pretext. In other women it subsides entirely and the parts become quite free from pain. In such a case there is less likelihood of recurring acute attacks, but yet they do occur. A woman carrying diseased tubes and ovaries due to pelvic inflammation may be confined to her bed as often

as three or four times a year, for from two to eight weeks at each attack. Usually the recurrence is not so severe, and may not happen oftener than once every year or two; others only last a few weeks, frequently not even confining the woman to bed. Exposure to cold, excessive indulgence in coition, violence on the part of the husband, working tread-machines, hard work of a hundred and one different kinds, generally determines the exacerbation. During the menstrual period the women are peculiarly liable to these attacks. The physiological congestion of menstruation may very readily be turned into a pathological condition, and an inflammation result. Women afflicted with pelvic inflammations frequently suffer from attacks of apparent peritonitis which simulate to a great degree the true inflammation. The abdomen and pelvis at the time of the examination are found to be exquisitely tender, and not infrequently an investigation is rendered impossible. By persisting firmly but gently, at the same time calling the patient's attention to some other object, a pelvis and abdomen which would barely tolerate the approach of the hand may be brought to bear, without any complaint from the patient, a very free amount of manipulation. The hysterical element in these cases of long suffering is oftentimes great, and it must always be taken into consideration in estimating the amount of pain.

*Pyosalpinx and Ovarian Abscess.*—Should suppuration intervene, there is at once added the element of septicemia. The tube may contain but a few drops of pus, in which case the only additional aid to the diagnosis would be in the special symptoms produced by the absorption of the pus. Following confinement or miscarriage, a woman may have a slow and unsatisfactory "get up," or she may not get up at all. Her temperature remains in the neighborhood of 100° F., while her pulse-beats continue at about 100 or more. She has no appetite, suffers with pain in the lower part of the abdomen, sleeps restlessly, and has occasional creepy feelings. This condition keeps up for months, with a progressive loss of flesh—slight, it is true, but steady. An examination reveals a mild form of pelvic inflammation, with the usual lesion of the appendages. This condition, taken in connection with the history, fairly establishes the presumption that pus is present if all other possible sources of suppuration are excluded, although it is impossible to detect any signs of it by the vaginal examination. Should pus accumulate in any great quantity, the Fallopian tubes soon distend,



and may at times reach the size of large sausages. Should the suppuration occur in the tube, in the lymph around the tube, or in the ovary, there would be little if any difference in the result. Wherever it is located, if the quantity be sufficiently large, the pelvic tumor fluctuates or the whole mass presents a semi-soft or boggy feeling. Not infrequently the fluid portion of the suppurating contents is absorbed altogether, leaving the tube filled with a cheesy material which may remain indefinitely and without causing any particular disturbance, other than by the mere presence of a foreign body in the pelvis. When such a case has been complicated by an inflammation of the peritoneum, the same condition may remain, and the patient suffer just as much as though the fluid had not been absorbed. Fallopian tubes of this character become at times the size of large sweet potatoes. It is exceedingly difficult frequently to distinguish pyosalpinx and ovarian abscess from some other pelvic diseases, notably extra-uterine pregnancy or abscess located in other parts of the pelvis. No two pelvic diseases are so frequently mistaken for one another as pyosalpinx and ectopic gestation. A careful study of the history of the patient is at times essential to a determination of the difference, and is of more value than the physical signs. Extra-uterine pregnancy produces symptoms which, if they can be elicited, are characteristic, but they are so frequently modified that it is difficult to distinguish them. The pain in the two diseases may essentially be alike, at least so far as a description of it can be elicited from the patient: the physical characteristics of the cysts are not dissimilar, both being semifluctuant, located in the same position, of the same shape, and of about the same size in the early stages of the pregnancy. The uterus is enlarged in both, the menstrual function is disordered, and the breast and stomach symptoms are not infrequently similar in either case. The casting off of the decidual membrane is by no means a constantly demonstrable feature of the extra-uterine pregnancy. The progressive growth of the tumor, if the patient be kept under observation sufficiently long, is very suggestive, if not positive evidence, of ectopic gestation.

Suppuration confined to the Fallopian tubes or ovaries is more apt to give a circumscribed tumor than suppuration in the plastic lymph or connective tissue. In the case of a pyosalpinx or ovarian tumor the tube-sac can be felt as a distinct body, adherent and immovable, it is true, but still a circumscribed tumor, with a distinct sulcus



between it and the uterus. The true pelvic abscess is quite the reverse, and oftentimes nothing definite can be made out, only a general fulness occupying the pelvis more or less, without any definite limitations, and so involving all the pelvic organs that none of them can be distinguished. In either case there may or may not be fluctuation.

Cystic tumors are distinguished from a pyosalpinx or ovarian abscess by the thickness of the walls of the latter, the more boggy feel, the septic symptoms, and the history. A tubal and ovarian mass confined to the pelvis, fluctuating, with thick walls, densely adherent, painful on examination, with a history of sepsis, can hardly be mistaken for anything but a tubal or ovarian abscess unless it be an extra-uterine pregnancy.

*Peritonitis.*—Pelvic peritonitis in women rarely if ever exists without a pre-existing endometritis and salpingitis; among the exceptions it has been noted that an appendicitis has occasionally been the source of the disease. These cases are rare, and although the vermiform appendix has not infrequently been found in the pelvis perforated and adherent to the Fallopian tube and ovary, with abscesses in the surrounding lymph, yet it is always a question as to whether the inflammation started in the Fallopian tube or in the vermiform appendix. The diagnosis would rest in such a case almost entirely upon the history. Wherever the disease originates, the result has been observed to be the same—a salpingitis and a peritonitis. When the symptoms and diagnosis of salpingitis have been considered, about all that can be said about peritonitis has been told, for the reason that inflammation of the Fallopian tube and the symptoms arising from the combined disease originate mostly in the peritonitis. A salpingitis uncomplicated by an inflammation of the peritoneum would give rise to but few symptoms. Such is the case with catarrhal salpingitis, and even with its resultant lesion, hydro-salpinx. It is the peritonitis accompanying the salpingitis that causes the formation of the large masses of lymph, the subsequent adhesions and immobility of the organs, the pain, the leucorrheal discharges (in part), the disordered menstrual function, and, in fact, all the prominent symptoms of the disorder. The extent to which peritonitis exists in any given case is oftentimes problematic and can only be guessed at. The whole pelvis may be involved or the lesion may be limited to a fractional part of it. The less of the serous membrane involved, the less will be the pain and the fewer

the adhesions. In the acute stage of the inflammation lymph is thrown out about the parts affected, and the contiguous serous surfaces become attached to one another. These points can be palpated and a fairly clear idea of their extent obtained. The exudated lymph may be confined about the Fallopian tubes or ovaries, one or both, or it may be found that the loops of intestine and omentum overlying the pelvic inlet have become involved, and are adherent to each other and to the pelvic organs. This lymph exudation and adhesion is Nature's method of heading off an inflammation of the serous membrane, and it is interesting to note the repeated and continued exudation, as the inflammatory process overcomes the areas it has first attempted to protect, knuckle after knuckle of the intestine becoming glued together in front of the advancing infection, until the lymph has finally effectually stayed its progress. The result in bad cases is an indurated mass in the lower portion of the abdomen, overlying and dipping down into the pelvic inlet. With the patient's history and the presence of such a tumor it is not hard to realize the relation of cause and effect. Such a mass is usually more or less tympanitic and immovable. Under treatment, unless suppuration has occurred, these masses disappear to a great extent, leaving the intestine and omentum adherent, it is true, but as the lymph has been absorbed the mass has lost its hard, indurated character, and has assumed more nearly the usual characteristics of the soft intestine. In fact, as a distinct tumor the whole mass generally disappears; in some cases, on the other hand, it remains to the end. Should suppuration occur, this is the usual course. Suppuration of the tubal contents is very common, and is not infrequently associated with a breaking down of the peritoneal lymph surrounding the appendages at several points, resulting in the formation of one or more small abscesses about the appendages. These surrounding abscesses are commonly spoken of as occurring in the connective tissue, but they arise distinctly from and in the plastic lymph. It is not possible to diagnose their existence prior to an operation unless they spread and become large enough to overshadow the tubal or ovarian abscess. Even then it is more than probable that they would be mistaken for an abscess located in the Fallopian tube or ovary. As a matter of fact, they do not often become so very large, unless the infection has travelled fast and overcome the resistance of the obstructing lymph, forming a large pelvic abscess—intra-peritoneal as a matter of fact, as are almost all the pelvic abscesses.

It is possible at times to say that the pelvic abscess exists, but usually the distinction can only be made between a true pelvic abscess and a bad case of pyosalpinx by an experienced diagnostician, the points of difference being determined by the physician's personal experience and delicacy of tactile sense. As a rule, where there is a large indurated mass rising into the abdominal cavity free pus will be found in the pelvis; but this is by no means a sure sign. When the pelvis is full of free pus, the vaginal vault is apt to give a sense of fulness and induration in all directions, as if the whole pelvis were filled with a solid mass. This feeling extending more or less over the whole of the pelvic floor, none of the pelvic organs can be outlined; the uterus is fixed in its position, whatever that may be. Fluctuation may or may not be detected; frequently the pelvic floor is so hard and indurated that this sign is very uncertain. That a bad pelvic inflammation has existed, and that suppuration has occurred, are usually unmistakable. Anything further in the line of an exact diagnosis must rest on the particular features of the special case and the physician's dexterity and experience.

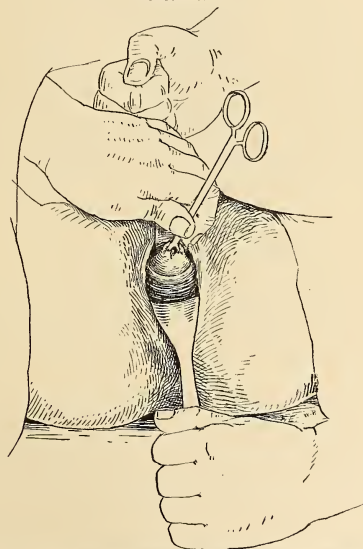
*Cellulitis.*—What has been said about peritonitis is also true of cellulitis. A few cases of this disease may arise in puerperal patients by transmission of the inflammation along the walls of the lymphatics and suppuration of the cellular tissue. Such cases are rare, and if they do exist cannot be diagnosed from the intra-peritoneal pelvic abscesses, those which arise within the peritoneal sac from breaking down and suppuration of the peritoneal lymph and exudates. Inflammation of the cellular tissue always accompanies a severe peritonitis, and the two are indistinguishable from a diagnostic point of view. The cellular tissue in the broad ligaments becomes involved in the course of a pelvic inflammation, the result being a distension of the ligament by exudates and a destruction of the cellular elements by the inflammatory process. As the inflammation subsides, the ligament is contracted or destroyed, which result may be recognized at a subsequent investigation after the case becomes a chronic one.

The usual points of distinction between a pelvic cellulitis and a pelvic peritonitis, as formulated and compared in all works on gynecology, are misleading and worthless. It is utterly impossible for any one to make a practical distinction between these two phases of a common disease, and the formulæ as given only tend to complicate

the understanding of what is possible and what is clinically true. The difference is purely theoretical; practically and clinically they are part and parcel of the same disease—viz. pelvic inflammation. The cellular tissue rarely suppurates except in conjunction with the suppuration of the peritoneal exudates. When it does break down, it cannot be distinguished, short of operation, from other forms of pelvic abscess. The disease, except in the form of an abscess, never exists as a chronic condition; its resultant contraction of the broad ligament may exist and be recognized, but the cellular inflammation has ended in the acute attack by a destruction of the connective tissue.

After all methods have been exhausted there remain a certain small class of cases of pelvic disease in which a positive differentia-

FIG. 268.

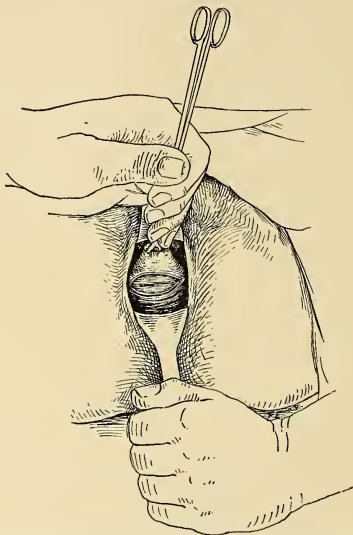


The fold behind the cervix which lies over the cervico-vaginal junction is well shown. The vagina is to be incised here. (From life.)

tion of the lesions cannot be made. The conditions are such that it becomes necessary to clear up the diagnosis and determine the pathological lesions. There are two ways of doing this: either by

laparotomy or by posterior vaginal section, as suggested by Pryor. Exploratory laparotomy is merely the usual first step as practised in every abdominal section and is described under that heading.

FIG. 269.



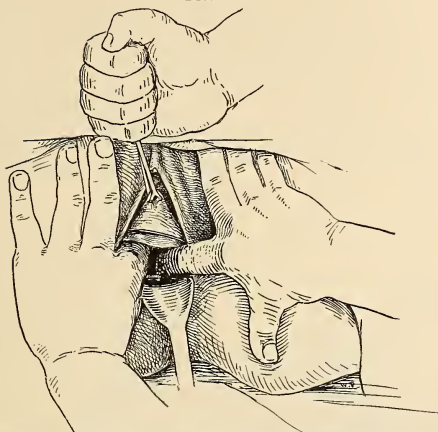
The vagina is incised, and the point at which the peritoneum is reflected from the uterus is shown as the deepest part of the cut. The peritoneum is to be torn through at this point. (From life).

*Posterior Vaginal Section.*—The patient is placed in the lithotomy posture.

The uterus is curetted and irrigated. All instruments employed in this procedure are then cast aside and the vagina is again cleansed. With stout, blunt traction forceps, the uterus is pulled down, and the point at which the vagina is reflected from the cervix is demonstrated by moving the cervix up and down in the vaginal vault. This point of reflection is shown by a crescentic fold which appears just behind the cervix when the cervix is shoved up (Fig. 268).

Picking up this fold in the middle with strong mouse-tooth forceps, the operator cuts through the vaginal mucous membrane. This incision is extended to each side, making a cut about an inch long. The scissors cut through the vaginal mucosa only. The posterior

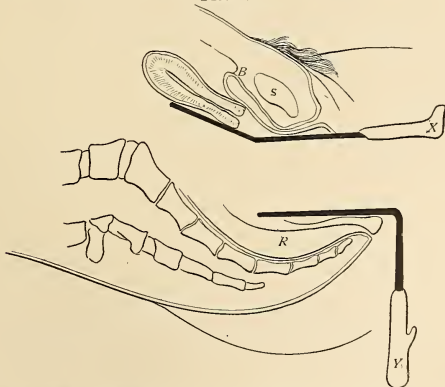
FIG. 270.



The index fingers are inserted into the opening in the cul-de-sac, and the incision is enlarged by blunt tearing with the fingers. (From life.)

flap is now grasped at its centre by stout forceps, and while making down-traction upon the uterus and this flap, the operator pushes his

FIG. 271.



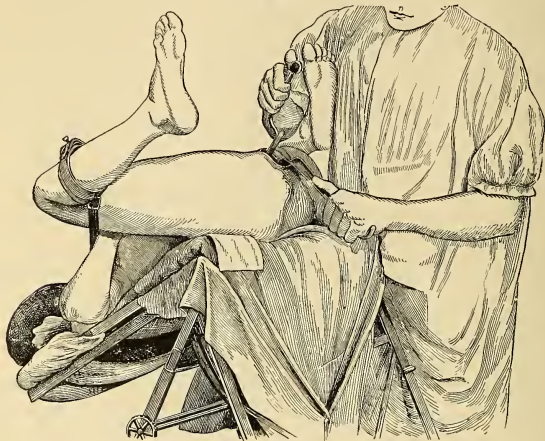
The uterus is held up behind the symphysis (S) with the bladder (B) by the trowel (X), while the rectum (R) and the posterior vaginal wall are pulled down by the retractor (Y).

finger into the cul-de-sac up to the level of the internal os (Fig. 269).



If the finger has not already perforated the peritoneum, the cavity is wiped dry and the peritoneum picked up with forceps and cut with scissors. A digital examination of the pelvic contents is

FIG. 272.



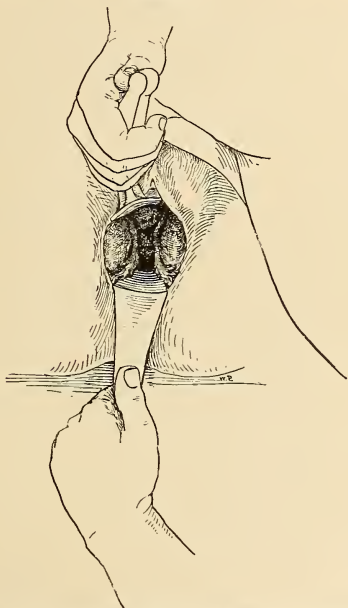
The cul-de-sac is opened. The posterior vaginal wall is held down by the retractor, while with the trowel the uterus is shoved up against the bladder. The space obtained is estimated by comparing the length of the operator's index finger with the distance between the blades of the retractors. In this case it was  $2\frac{1}{4}$  inches. (From life.)

now made, still keeping up down-traction on the uterus. Having satisfied himself that an ocular inspection is necessary, the operator introduces two fingers into the opening in the cul-de-sac, and, separating them laterally, he tears the vaginal mucous membrane and peritoneum (Fig. 270). Very rarely will the vaginal mucosa be found so stout that he cannot do this. Should it be so, he will lightly touch it with a scalpel in the direction in which he wishes the tissues to separate. The medium blade of the long Péan retractor is introduced into the pelvic cavity, the forceps on the posterior flap are removed, and the cervix is freed from the traction forceps. The Péan-Pryor trowel is now inserted into the pelvis and the uterus forced up behind the symphysis (Fig. 271). This will widely open up the pelvic cavity. Into this opening a gauze pad, to which is attached a stout string, is inserted to prevent descent of the intestines and to catch any sero-sanguineous fluid.

The patient, still on the back and with legs bent upon the trunk,

is thrown into Trendelenberg's position (Fig. 272). By gentle manipulation with small gauze pads held by forceps the intestines and omentum are made to enter the abdominal cavity. When it is found that the intestines are adherent, they are gently freed. The whole pelvic cavity may now be readily inspected and the diagnosis is established. Even the vermiform appendix, if it be suspended in the pelvis, may be seen. The uterine appendages may be gently

FIG 273.



The adnexa have been freed, and are brought down into the vagina. Above them are coils of intestine.  
(From life.)

drawn into the incision and minutely inspected, and should any treatment be indicated which may be carried out through a vaginal incision, the operator is in a position to proceed at once with the proper manipulations.

Having satisfactorily examined the pelvis, all fluid is wiped away, the uterus again washed out, and packed full of iodoform gauze. Everything is removed from the peritoneal cavity, and a

loose plug of iodoform gauze is inserted just within the edges of the vaginal rent, which must fill the opening to prevent protrusion of small intestine. The uterus and this plug are replaced *en masse* and the vagina is filled with gauze. A self-retaining rubber catheter is inserted into the bladder, and the sphincter ani dilated. On the third day the patient is put in Sims' position and the uterine packing removed without irrigation. Whatever vaginal gauze has been taken out to do this is replaced by fresh dressing. The cul-de-sac plug is left in for from seven to ten days, according to the character of the case. It is removed and replaced under a short chloroform narcosis. In doing this the patient is in Sims' position. The operator must be careful to support the cervix anteriorly with the trowel, so as not to disturb the lymph behind the uterus. A second dressing is made a week later, without pain, and repeated until the opening closes. The patient is allowed to sit up in bed after the first dressing, get out of bed in two weeks, and becomes an office case in from two to three weeks. The peritoneal cavity is entered in from one to five minutes.

PROGNOSIS.—The prognosis of pelvic inflammations is variable according to the phase which the disease assumes, the character of the infection, and the manner in which it is treated. It may end in complete recovery, permanent crippling, or death. Catarrhal salpingitis usually undergoes a spontaneous cure, at times with a complete restoration of the tissues to their normal condition of health, oftener after the destruction and desquamation of the ciliated epithelium. Should the Fallopian tubes become occluded at any point, sterility is an accomplished fact, and either a hydro- or hematosalpinx a possibility. Even without occlusion of the Fallopian tube sterility is frequent, from the fact that the cilia, whose function it is to carry the ovum toward the uterine cavity, are lost, and the ovum may lodge at any point throughout the length of the tube, and there perish, or it may be so long delayed in its passage as to be too enfeebled to become impregnated when it meets the spermatozoid. Extra-uterine pregnancy is commonly accompanied by a history of long-standing sterility, and it is this disease which is supposed to be the cause of the misplaced conception. The ovum, lodging in the Fallopian tube, becomes impregnated by the spermatozoid, and, not being able to escape into the uterine cavity, develops in the tube.

If the ends of the tube remain patulous, there is no great danger

of an accumulation of the excretions, but should they become closed, a hydrosalpinx is almost inevitable, unless the excretions have ceased or the absorptive powers of the tube are equal to the occasion. Hydrosalpinx is not fraught with any great danger to life, and unless it becomes complicated by pelvic peritonitis is not liable to cause any great discomfort to the patient. It would act in much the same manner as would small unadherent ovaries. Should peritonitis supervene and adhesions result, the patient would suffer from long-continued pelvic distress and pains, and would be liable to secondary attacks of peritonitis. Hematosalpinx acts in much the same manner, it being more liable to inflammatory complications. Interstitial salpingitis always threatens life, for the reason that it is always complicated by pelvic peritonitis. The affected Fallopian tube is always occluded, either throughout its course or at its distal end, by the fimbria becoming adherent to the ovary. If both tubes are so affected, sterility is certain and permanent. The amount of danger to life will depend in great part upon the amount of the complicating peritonitis and cellulitis. If the infection has been a particularly virulent one, and has escaped out of the fimbriated end of the Fallopian tube before Nature has had an opportunity to build up a wall of obstructing lymph, it will probably infect the larger part of the pelvic cavity before its course can be stayed: should it escape into the abdominal cavity, a general peritonitis is likely to result, and death follow. Puerperal septic infection is more liable to have this termination than gonorrheal infection, although the latter claims its fair share of victims. Women who have acquired interstitial salpingitis, and in whom the disease has become chronic, are very liable to suffer from recurrent attacks of peritonitis. These attacks occur more or less frequently and with more or less severity. At any time they may develop into a general peritonitis and end fatally, or suppurative changes may be set up which will require a surgical operation to save the patient's life. So long as they remain quiescent they cause little more damage than that brought about by the constant pain. On the other hand, they may render the patient's life miserable, the only prospect of relief being either their removal or the menopause. It is an undoubted fact that the change of life, when it becomes established, brings relief and cure to many of these women: the disease, however, frequently accompanies delayed menopause, and is most probably the cause of the delay. Spontaneous cures other than by the menopause are rare; at the same time, it

cannot be successfully disputed that such is the case in a small proportion of cases.

Pyosalpinx and ovarian abscess are much more liable to be accompanied with recurrent attacks of peritonitis, and are consequently more serious lesions, than any of the other forms of disease of the uterine appendages. Usually they mean lifelong invalidism to the patient if she escapes primary death. Death is often the least of the consequences of this lesion. The patient drags along in a miserable condition of sepsis, with its resulting fever, hectic, and emaciation, until she dies of exhaustion or until the abscess has succeeded in finding an outlet into some of the neighboring viscera: even then her last state is hardly better than her first. Should the rupture occur into the uterus, a spontaneous cure may result, or the tube may refill and discharge repeatedly, all the while with the chance of its calibre becoming permanently closed. Should leakage take place from the fimbriated end into the peritoneal cavity, a general suppurative peritonitis may result, with its usual ending. Should, on the other hand, the pus find its way through the bowel or bladder-walls, a sinus will be formed which will most probably refuse to yield to any treatment short of surgical. This disease, at the best, means a lifelong invalidism to the patient, and is a constant menace to her life. Much the same may be said of abscesses in the pelvis due to peritonitis and cellulitis. Those occurring primarily in the cellular tissue, following labor, are said to run a rapid course, and generally end in death, unless they are recognized and provision made for the discharge of the pus. Even with this precaution many cases die. The same may be said to be true in a lessened degree of ordinary pelvic abscesses, although this form is apt to give sufficient time in which the physician may act. If these abscesses are properly opened and drained, the chances for the patient's recovery are good. Should they be neglected, the woman will either die from the exhaustion of septicemia, or the abscesses will open spontaneously in one of the many ways already described. Frequently it is impossible to obtain healing of the sinus tracks made by the burrowing of the pus from these abscesses, and, in spite of the fact that the abscess-cavity is emptied, the purulent discharge continues indefinitely, the patient eking out a miserable, lingering existence, only to die finally of exhaustion.

**TREATMENT.**—The treatment of pelvic inflammation is satisfactory in accordance with the stage of the disease and the manner



in which it is attacked. It is one of the preventable diseases, and if the infection is taken in hand in time it is perfectly amenable to treatment. After it has gained full headway it is only possible to ameliorate the symptoms, and finally, if necessary, to remove the resulting lesions. The treatment is prophylactic, palliative, and curative.

The prevention is embraced in the treatment and cure of the infection while it is still confined to the vagina and to the uterus. If the vaginitis or endometritis be taken in time, the disease may readily be stayed and a pelvic involvement prevented. This is true of the majority of cases, but it must be borne in mind that there is a certain proportion, of puerperal patients particularly, in whom the infection travels so rapidly that the serous membrane is involved before the physician has time to realize that the danger is seriously threatened; this is also true of a small proportion of gonorrheal cases. In spite of the existence of these exceptional cases, it is a lamentable fact that the majority of pelvic inflammations are preventable, and that the attending physician is only too frequently responsible—if not for sins of commission, at least for sins of omission. If a patient be suffering from gonorrhea, it should always be attacked vigorously and scientifically, ever bearing in mind that the mildest case may result in irreparable damage to the pelvic peritoneum, and may even result in death. The vagina must be exposed throughout its whole extent and thoroughly treated, and, if the endometrium becomes involved, it should receive equally prompt attention. The methods of treatment of these troubles will be found fully expounded in the chapter on Inflammatory Diseases of the Uterus. Infection starting in the uterus from a post-puerperal sepsis should never be neglected. General treatment as it is too often indulged in by the physician is only playing with fire, and, like the proverbial child, his fingers are frequently burned. Every woman who after a labor or a miscarriage has an elevation of temperature and pulse, together with discharges which smell badly, provided conditions other than sepsis are excluded, should at once have an antiseptic vaginal douche. Should the temperature and pulse not fall to normal or thereabouts after several such douches repeated at half a dozen hours' interval, the syringe should be carried to the fundus of the uterus and a similar injection made into the cavity of the womb. If after repeating this treatment several times in the twenty-four hours the patient's symptoms have not



subsided or become markedly better, the physician is committing an inexcusable blunder if he does not thoroughly curette the whole of the cavity of the womb, irrigate it, and render it as aseptic as possible. Should all cases of gonorrhea and puerperal sepsis be treated on these common-sense principles, pelvic inflammations in women would be far rarer than they are at the present time. To just the extent of intelligence with which the physician treats these cases will he have the fewer cases of pelvic trouble originating in his practice.

Should the disease once invade the Fallopian tubes, it is beyond local treatment, and it is largely a matter of chance as to how far it will spread and how much damage it will succeed in doing before being brought under control. In Nature's hands lie the most effective weapons for combating the inflammation, and practically all the physician is able to do is to aid by placing the patient under the most favorable circumstances possible and giving Nature every chance to succeed in her fight. In the acute form of the disease two objects must constantly be kept in mind: the force of the inflammation must be weakened in every possible way, and Nature must be left unhampered to wage the fight. As in every inflammation, rest is absolutely essential. By "rest" is meant sexual as well as physical quietude. The woman should be placed in bed, and kept there until the attack has subsided: sexual intercourse should not only absolutely be prohibited, but even the approach of the husband, sufficient to excite pelvic congestion, must carefully be guarded against. Many an attack of threatened pelvic inflammation has been precipitated by indiscretions in these directions. During the menstrual periods the greatest caution is necessary. The congestion incident to this period is physiological, but in a patient who is threatened with a pelvic inflammation, or in one in whom the inflammation is actually in existence, it may readily be converted into a pathological state and the inflammatory attack be precipitated. Rest cannot be obtained perfectly if the bowels, especially the sigmoid flexure and rectum, are allowed to become overloaded with fecal matter. The hard, scybalous masses which form under these circumstances are a continual source of irritation. Woman is naturally a constipated animal, but these masses are the more apt to form, inasmuch as the peristaltic action of the bowel is in great part inhibited by the inflammation of its serous coat. It becomes a matter of prime importance, then, to empty and keep the lower bowel free from accumulations of fecal matter. Absolute

rest having been secured, depletion is next to be obtained. The intestinal tract is the most adapted of all sources for bringing about this result. The free use of some drastic purgative will best conserve the purpose. Possibly some one of the magnesium salts is the best drug for this use. Magnesium sulphate, administered in doses of a teaspoonful, dissolved in a small quantity of water, a saturated solution being preferable, each hour, for from six to ten doses, will usually produce the desired result. Should the salts be rejected, as they sometimes are, any other purgative may be substituted. The bowel will incidentally be emptied of its fecal contents, and large and repeated watery stools will result. The amount of damage done by friction set up by the peristaltic action of the intestines will be far outweighed by the good done by the general and local depletion. The watery stools are produced by drawing on the fluid element in the blood-vessels from all over the body, but particularly from those near and connected with the intestinal tract. The withdrawal of this fluid lessens the blood-supply to the inflamed parts, and at the same time creates such an intense demand for fluid in the vascular system that the inflammatory exudates are taken up the quicker. A pelvic inflammation which is just starting is often cut short by this procedure, and it is at times surprising to see the amount of relief experienced by patients, as demonstrated by the cessation of pain and the absence of the anxious expression of the countenance. One free movement of the bowels will in some cases act more promptly in this direction than will several hypodermics of morphia. There are certain cases, however—usually those who have been suffering for some time before having come under treatment—whom the treatment will not relieve, it matters not how many times the bowels are moved. Inflammations in the pelvis are like inflammations in any other part of the body: if depletion is not applied until the trouble is chronic, there is little to be expected from it; in the acute stage it is invaluable.

It is not possible to keep up purgation indefinitely, and especially if the patient be not particularly strong, care and discretion must be used in this direction. It is well, if the woman can stand it—and the vast majority of them are able to do so—to procure one good purgation consisting of six to ten free watery stools. After this the bowels may be kept soluble daily by administering a laxative once in the twenty-four hours. After purgation hot vaginal douching is perhaps the best method of securing continued depletion of the pel-

vis. If the douches be given properly, they will go a long way toward effecting a speedy reduction of the inflammation; if they are given improperly, they will only render matters more complicated. Douches as usually employed by the profession at large were far better done away with altogether, as they only tend to render the pelvic inflammation worse. The primary effect of the application of hot water is to cause a congestion and the determination of large quantities of blood to the parts, as any one can demonstrate for himself by placing his hands in hot water and noting how puffy they become. If the water be sufficiently hot and the hand be held in it long enough, the tissues will begin to shrink, and what is commonly known as the "washerwoman's hands" will be the result. This condition is brought about by the secondary action of the hot water; that is, contraction of the soft tissues. This contraction renders the calibre of the blood-vessels smaller, and drives a very considerable proportion of the blood out of the parts so affected. The more profoundly this action is produced and the longer it is kept up, the more complete and lasting will be the depletion. It is this secondary effect of the hot water that it is desirable to produce in the pelvis. The more thoroughly the blood is driven away from the parts, the sooner will the inflammation subside; the more frequently the action is brought about, the sooner will the blood-vessels acquire sufficient tone to limit the amount of blood they will hold and its powers of exudation. For the successful accomplishment of this object there are a few rules which it is imperative to keep in mind and carry out: The water must be hot, from 100° to 110° F., and to be sure that it is of this temperature a thermometer should be used. The water must be of sufficient quantity to produce the desired secondary action; for this purpose at least a gallon should be used at each injection. It must be applied directly and continuously to the parts to be affected; for this purpose the patient should lie in the recumbent dorsal position while the douche is being administered. It is important that this rule be observed, for the reason that should the woman assume a crouching or sitting position all of the water runs away as quickly as it is injected, barely coming in contact with the vaginal vault, the very part which it is desirable to reach. With the woman lying flat upon her back and the knees drawn up, the posterior portion of the vagina will be distended with water, and there will always be a residual amount *in situ*, which is constantly bathing

the parts and is kept at the proper temperature by the continued injection. The douche should occupy from fifteen to twenty minutes in its application, and can best be taken in the bath-tub, if the patient is able to be up and about, and is forced to use it without the aid of a second person. The syringe, of whatever kind used, must have a hard-rubber nozzle, as metal, being a good conductor of heat, will burn the parts if the water is used as hot as is needed. These douches may be administered two or three times a day, and may be continued for an unlimited time, depending on their effect and the way in which the patient progresses; but in beginning them, it must be remembered that they are apt to cause a patient to feel exhausted; in fact, a patient is occasionally found not to be able to use them at all on this account.

Depletion may be obtained with advantage in certain cases by direct bloodletting. A free scarification of the cervix will not infrequently, early in the acute cases, give an immense amount of relief, and may even materially limit the extent and severity of the attack. This aid in the treatment is much neglected at the present day, but it will at suitable periods in an attack of pelvic inflammation be found of great service. If the treatment is attempted, it should be done in a thorough manner. The cervix uteri is to be well exposed by the aid of a speculum, and deeply punctured at a number of points, so as to cause free bleeding. Ten or fifteen punctures are none too many, and from three to six ounces of blood will not be too much to withdraw; it will, in fact, be difficult to obtain so much. It may be desirable to have the depletion continue for some little time, and if a light glycerin tampon will not aid the actual flow of blood, it will withdraw a portion of the watery element from the surrounding tissues, and thus in a mild way contribute its aid toward a continued depletion. It is not advisable or necessary to use all these methods of depletion in every case of pelvic peritonitis: they are the best methods at our command, and must be used with judgment as the indications for them arise in particular cases. In the acute form of the disease, when there is considerable induration, it has been proposed that an aspirating needle be thrust into the mass through the vaginal vault and the serous exudates drawn away. It is claimed that the depletion thus obtained will end the attack in a very short time. The amount of good derived by this measure will not be commensurate with the risks of carrying infection on the needle and thus causing suppuration.

Should the pain become so great as to be unbearable before the inflammation has subsided sufficiently to give relief, it is eminently proper to administer an opiate for its temporary action. It is well to remember that opium in any form depresses the heart, lessens the excretive and absorptive powers of the tissues, and inhibits peristaltic action of the bowels, all of which effects are contra-indicated in these diseases. It is exceedingly desirable that excretion and absorption should be free and that the bowels should remain soluble. For these reasons, if it becomes necessary to use an opiate—and it should only be used if absolutely necessary—that form is to be selected which will cause the least harm, and it is to be administered in as small quantities at as long intervals as is compatible with obtaining the effect desired. Morphia, used hypodermically, is least objectionable of all the forms of opium. Frequently one dose of an eighth of a grain is sufficient, but it may be necessary to repeat it at intervals of five or six hours for several doses. One injection of morphia in this dose will often relieve the patient of her intense pain until a movement of the bowels can be secured, when, as a rule, there will be no necessity for its repetition. The one dose can do no possible harm; it does not even delay securing the desired movement of the bowels.

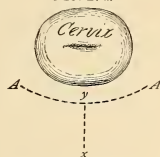
Counter-irritants are not of any great importance in the acute form of the disease, but when it has assumed more of a subacute or chronic condition, they have their uses. Iodine applied freely to the vaginal vault and over the lower part of the abdomen once a day will give a certain amount of relief; whether it be actual or imaginary matters little; it can do no possible harm, and at least gives the comfort of the knowledge that something is being done. While not a great deal of reliance can be placed upon it, yet it is occasionally a matter of difficulty to explain the apparent cause and effect between the application of the treatment and the resulting relief. It is so uniformly used in conjunction with other treatment that it is sometimes hard to say whether or not it accomplishes good. Turpentine stupes and poultices to the abdomen do no harm and little good; what good they do accomplish is incidentally through the heat which accompanies their application, and is more mental than real: the good derived from blisters is hardly sufficient to counterbalance the amount of suffering they cause. These are all remedies which are very generally used, and serve as well as anything else to keep the patient satisfied that every possible thing is being done for her.



Little or no attention need be paid to the pulse and temperature, other than to watch them closely in order to note the progress of the disease. They are symptoms which will take care of themselves, and never call for any especial treatment: they will fluctuate with the inflammation, but seldom rise sufficiently high, or remain high long enough, to cause any organic changes in the tissues, unless pus be present. Under any circumstances the disease is to be treated, and not its symptoms. Antipyretics are never indicated, and only when sepsis arises are heart-stimulants called for. Diuretics and diaphoretics would have their places for purposes of depletion were there not much more prompt and efficient means at our disposal. Diet and drink are both important elements in the treatment. The diet should be light, but nourishing—of such a character as to make as little fecal matter as possible, at the same time not to furnish an excess of fluid. It is well for the first few days of the attack that fluid should be withheld as much as possible, so that the inflammatory excretions may the more quickly be absorbed. The patient should be kept confined to bed until all pain and local tenderness has disappeared. If this line of treatment be carried out systematically and carefully, there is a chance in a certain proportion of cases that a permanent cure may result and the parts be restored to a fair condition of functional health.

Should this treatment fail to stay the acute disease, posterior vaginal incision, as suggested by Henrotin, may accomplish the result. The procedure is accompanied by little danger. The object is to open the connective-tissue spaces about the uterus, and, after breaking up adhesions and penetrating any masses of exudate met with, to drain the resulting cavities. The operation consists in making an incision, moderately circular, close to or rather slightly on the posterior surface of the cervix, and to dissect back the vaginal mucosa through the cellular tissue to a point beyond which the wounding of the uterine artery seems improbable. The incision never extends beyond the outer limits of the cervix. If necessary, more room may be gained by joining this incision with another one running directly backward in the median raphé of the vagina, care being taken not to penetrate sufficiently deep to wound the rectum. With the exception of the incision

FIG. 274.



The cul-de-sac incision is made from A to A. If more room is desired, the incision is extended down the median raphé of the vagina from y to z.



through the vaginal mucosa, all manipulations are made with the finger exclusively. The disengaged hand being placed upon the abdomen, the operator proceeds as in making a bimanual palpation, and with the index finger of the vaginal hand gradually penetrates the tissues in the direction of the centre of the affected region, whether this be laterally in the broad ligaments or posteriorly in the peritoneal cavity. All exudates are penetrated, all adhesions are broken up, and free drainage established. The cavities entered are packed loosely with sterile gauze, the free ends of which are left hanging in the vagina. The whole vagina is loosely packed with gauze. The dressing is removed only after three or four days, at which time the cavities are gently irrigated and the packing renewed. This is repeated several times at two days' intervals, after which merely a daily vaginal douche is required. The operation takes from five to ten minutes only.

Frequently, in spite of the most careful treatment, the result will only be a relative one, and although the inflammation may subside after weeks' or even several months' treatment, yet masses of the exuded lymph, together with the disorganized Fallopian tube, remain, and the inflammation may be relighted at any time, when the whole treatment will have to be gone through with again. In certain cases the inflammation never entirely subsides, but the woman is a constant sufferer from pelvic pain and discharges. She eats little, sleeps badly, and coitus is more or less painful, as is also walking or jolting of any kind. Such patients will apply for relief after years of constant suffering. An examination will disclose a condition of interstitial salpingitis, masses of unabsorbed exudates, and a tender pelvis. The woman is able to be on her feet attending to her daily work, but is often a wreck of her former self. It is possible in many of these women to greatly improve their condition, provided pus is not present in the pelvis. Their relief naturally will only be tentative, for as long as the exudates and diseased appendages remain, they are liable under favorable circumstances to a return of all their aches and pains. The object to be aimed at in the treatment of these cases will be to bring about an absorption of the inflammatory exudates and to accomplish a subsidence of the inflammation. In these women rest, especially sexual rest, is essential to success. The only sure way of accomplishing this is by separating husband and wife, so that there may be no temptation: for this reason, where it is possible, a hospital is the best place to carry

out the treatment. When this is not possible, tamponing is quite effectual—in fact, is the only safeguard. The patient must be guarded as much as possible from over-exercise, especially the use of sewing- or similar machines. The clothing must be warm and dry, and all exposures to cold carefully avoided. The bowels should be kept soluble, and an occasional purgation for its depleting effect is indicated. Depletion may be obtained also by the use of the hot-water injections, as in the acute form of inflammation, but to result in any good it will be necessary to use them systematically and for a long period of time: they should be used once or twice daily for months. Glycerin tampons, alternating with counter-irritation over the whole vaginal vault by painting with iodine, are of service if properly used. In fact, the tampon can be utilized, after the parts have been painted with iodine, with advantage. Dry tampons are frequently serviceable, even aside from their use in preventing coitus. The weight of a heavy and engorged uterus, retro-displaced, dragging upon tender and adherent ovaries, together with any movement of the pelvic organs caused by walking or riding, is a constant source of distress, pain, and backache. If the patient be placed in the knee-chest, or even the lateral position, and the whole pelvic mass of diseased and adherent organs be allowed to gravitate toward the abdominal cavity, a tampon of some soft yielding material can be so placed as to fill the whole of the vagina, or even the posterior portion of it, care being taken not to pack it hard enough to cause trouble by its pressure. When the patient stands on her feet the pelvic organs gravitate back again toward their former position, but the tampon now receives their weight and holds them somewhat above their former level, if only for a fraction of an inch—sufficient at least to take the drag off the adhesions. In a certain class of cases the relief obtained from this procedure is remarkable. It is essential that the tampon be of some soft, elastic, unabsorbable material, and that it be placed so as not to make too much pressure. Surgical cotton absorbs moisture, loses its elasticity in a few hours, and becomes a hard foreign body in the vagina. In addition, it shrinks, so that it loses its effect so far as giving support is concerned. Wool is the best material for this use. The tampon is much superior to a pessary for accomplishing this end. But the fact that a pessary at times gives relief to the patient suffering from pelvic inflammatory disease is only explainable in this way. In spite of the fact that

a Smith-Hodge pessary will give relief in some few cases, it is a dangerous instrument to use in this disease. If an ovary is prolapsed, the pressure of the hard pessary will render its use unbearable from the pain it causes. Should a fall or jar occur while the pessary is *in situ*, it might readily transmit so much of a blow as to light up a latent inflammation or to rupture a cystic tube or ovary. A tampon is preferable in every way, and it may be put down as a good and safe rule that a pessary should never be employed in the presence of pelvic inflammation. Tampons, when used, should be removed at least every other day, and the vagina thoroughly cleansed and dried before a second one is introduced. If the tampon is thoroughly impregnated with some dry powder, such as boracic acid, it will keep sweet and clean the longer.

Where the application of iodine and glycerin has failed to relieve the pelvic pains and tenderness, ichthyol has been used. Ichthyol, either in its pure state or mixed with glycerin in equal parts, and applied on a tampon to the vaginal vault, has succeeded in relieving the tenderness in some cases when everything else has failed. These applications in order to accomplish any good must be made at least twice a week for the course of several months or more.

General medication accomplishes nothing directly; although potash, mercury, and other remedies have been lauded for their specific effect, there is no drug which, given internally, will have the slightest effect upon the inflammation or its products. The absorption of the infiltrates and exudates will greatly be aided as the condition of health of the patient is good or bad, and every effort should be made to build up the general health to as nearly a normal condition as possible. General tonics and alteratives, combined with a proper regulation of the bodily functions, a well-ordered diet, limited but healthful exercise, and slight stimulation when indicated, is the proper course of general treatment to follow. It aids in the cure simply by placing the tissues of the body in a favorable condition for performing their work, and by giving Nature a chance to rid the parts of the inflammation and its products.

Many of these patients are very much run down and have lost a considerable amount of flesh: they consequently need building up. Amongst other remedies for this purpose, electricity and massage have their place. General galvanism given daily for its

tonic and stimulating effect, together with general massage, is indicated. It is not necessary to submit the patient, as a general thing, to a strict course of "rest treatment," as the good effects of this method may be obtained by a very material modification, and the woman may be up and about, attending to a moderate amount of work, sufficient to keep her body and mind occupied, without allowing herself to become over-fatigued. Electricity applied locally to the pelvis is of very indefinite value. In the acute attack of inflammation it has no place, and its use can only result in harm. When the force of the inflammation has subsided and it has settled itself down into a subacute or chronic condition, electricity may at times be used with advantage. It will occasionally relieve the symptoms of pain and uterine hemorrhage when other remedies have failed, and, on the other hand, it will often fail to give relief to these symptoms; in fact, it will render them worse, when other remedies will bring about the desired effect. The relief obtained from this remedy is, like all others, merely temporary: it never cures the lesion, it simply relieves the symptoms, and, the disease being still present, the symptoms are liable at any time, under favorable circumstances, to return. It is claimed for electricity by its votaries that large pelvic inflammatory masses will shrink and disappear under its use. Such is in truth the case, but when we consider of what these masses are composed, it is easy to see why the remedy has been of service in causing them to disappear. They would have disappeared under any other proper method of treatment as well. In an acute attack of peritonitis great quantities of lymph are thrown about the diseased tubes and ovaries, forming large masses, which on palpation through the vaginal vault give an idea of size to the tube and ovary which is out of all proportion to their real size, the bulk of the tumor being made up of lymph-exudate, and, at times, exudates into the connective tissue. As the inflammation subsides, Nature causes an absorption of these exudates to a great extent, with the result that the pelvic mass gradually diminishes until nothing but the adherent tube and ovary remain; the appendage at times is quite small. In fact, the case under these circumstances has now assumed the chronic form of adherent interstitial salpingitis. It is this natural function of absorption which electricity stimulates and aids—nothing more, nothing less. In addition, the soothing effect of the galvanic current gives in a certain proportion of cases great

relief to the pain, while the uterine contraction induced by the stimulation of the uterine muscle, together with the direct effect of the cauterization upon the endometrium if sufficient current be applied, gradually lessens the amount of blood lost. As an aid in the treatment of cases of subacute or chronic pelvic inflammation the procedure is valuable: it is to be regarded as an additional remedy, only one of many, to be used as simpler and easier forms of treatment fail or are slow of accomplishing their object. In using this remedy the galvanic negative current should be selected, and the application may be made either intra-uterine or intra-vaginal, the latter being the safer. Where it is desirable to aid Nature in absorbing exudates and relieving pain, the current should not be stronger than the patient is able to bear without much pain; the application is to last but a short time, and is to be repeated two or three times a week. A good average application of the galvano-negative current, and one which is usually well borne, is in the neighborhood of fifty milliamperes applied for about three minutes. When the hemorrhage is excessive, it is better to use the positive pole, and the application should be made intra-uterine. Weaker currents, twenty to thirty milliamperes, are to be used where the galvano-positive current is selected, for the reason that this is much more painful than the galvano-negative and is not so readily borne by the patient. Even though the current is not sufficiently strong to cauterize the lining mucous membrane of the uterus, yet the positive pole coagulates the albuminoids of the tissues and causes contraction of the uterine muscles, in this way lessening uterine hemorrhage, and cutting off the blood-supply. It is only by its judicious and careful employment that any good can be obtained from the use of electricity: the careless or ignorant use of it may readily do more harm than good. It is essentially a remedy the use of which will for the most part remain in the hands of the specialist; it is of little use to the busy general practitioner, as the apparatus is complicated and expensive, and very considerable time and care must be spent in the application.

Massage has a much more limited use in pelvic inflammatory lesions, and is more dangerous in unskilled hands. It requires no especial apparatus. In the acute stages of the disease it has no place whatever, but its greatest use is in the chronic form, where there is a considerable quantity of unabsorbed exudate and lymph. The manipulations of the masseur act as exercise to the parts and



stimulate absorption. Under careful and very gentle movements it can readily be seen why in this way pelvic masses disappear or become smaller. Its use is decidedly objectionable even in this class of cases, for the reason that it is impossible to say whether or no there be pus in the midst of the mass. Many a Fallopian tube which is not much larger than normal contains pus or purulent material. The application of friction, pressure, or kneading in such a case may readily result in the leakage of some of the tubal contents into the abdominal cavity: even were there is no purulent matter present, the manipulation might very easily relight a sub-acute or chronic inflammation into an acute attack. It is claimed for the treatment that the pus from a pus-tube may be caused to escape into the uterine cavity and a cure thus be effected: it is much more likely that the pus would first escape through the fimbriated ends of the tubes or rupture take place in the walls of the abscess. In addition to the dangers attached to its use, its application is very painful unless the greatest care or the most delicate touch is employed. Even then some cases are for a long time intolerant of the necessary handling of the parts. The treatment is altogether too dangerous for the general practitioner to employ, and its use will always be confined to the hands of the few. Massage in these diseases consists in kneading the pelvic masses and applying friction to them to cause their absorption, and in moving the uterus in different directions to stretch and free its adhesions. The manipulation is carried out with one hand pressing through the abdominal wall and one or two fingers of the second hand in the vagina. The vaginal fingers are used mostly for lifting up and fixing the uterus or pelvic masses; the manipulations are carried on in great part by the abdominal hand. The reverse is true, however, in exceptional cases.

When suppuration has accompanied an attack of pelvic inflammation, the treatment which has been detailed, and which is applicable to some cases of the disease in its non-suppurative and non-cystic forms, is not to be considered. In these cases all the symptoms of septicemia are added to those which accompany the inflammation, and frequently the patient's life is threatened, if not immediately, at least remotely and constantly. Should the pus be confined to the Fallopian tubes, Nature occasionally relieves the danger by allowing it to escape into the uterine cavity. It has been proposed to take the hint from Nature as to the method of



treating pus-tubes, and accordingly the treatment of aspirating the Fallopian tubes by passing an instrument into the uterus, and thence into the tube through its occluded uterine opening, has been advocated. Could the procedure be carried out with any degree of safety and certainty, it would offer a method of cure in a certain proportion of cases which would at times be satisfactory, and at the same time not be attended with the dangers of abdominal section. The objection to the treatment which should condemn it to oblivion is the uncertainty, nay almost impossibility, of passing the instrument. The catheter or probe, whichever it be, is of necessity small in diameter—so small that it would be just as liable to perforate the diseased and softened uterine wall as the occluded opening in the tube, even if the point which that opening occupied could be found:

FIG. 275.

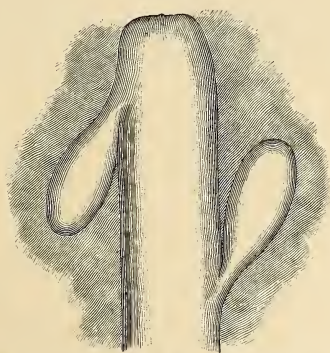


Drainage of Pelvic Abscess from the Vagina.

the manipulations necessary to accomplish the operation would be attended with so much traumatism and movement of the diseased parts that the inflammatory process might very readily be relighted or an abscess-cavity ruptured. If for no other reasons, the treatment should be utterly condemned; but pelvic abscesses are so notoriously multiple that the mere emptying of one of these pockets of pus would have no effect on those remaining, and there would be no

possible way of assuring one's self that some accumulation did not remain behind, it matters little how many had been drained. Where pus exists in the pelvis, there is but one treatment to be considered: evacuation by a surgical operation. A pelvic abscess should never be given an opportunity to evacuate itself. There is a point of election for the opening which, if left to Nature, will rarely be chosen. When pus exists, it should be evacuated at once; delay is unjustifiable, either for building up the patient or for any other reason. The patient will not improve as long as she is continuously absorbing septic matter, and the longer the delay the worse will be her condition for operation. If the abscess be an accumulation of pus within the pelvis *independent* of the Fallopian tube or ovary, be it either altogether intra-peritoneal or involving the cellular tissue, it is best to evacuate it without opening the general peritoneal cavity: the vagina is the one point at which this is feasible and proper. Even in those exceptional cases where the abscess has risen into the abdominal cavity, and it is possible to open it above the pubis without entering the general peritoneal cavity, the vagina offers the

FIG. 276.



Abscess-sacs opening into the Bowel. Opening obliquely above and below the level of the sac.

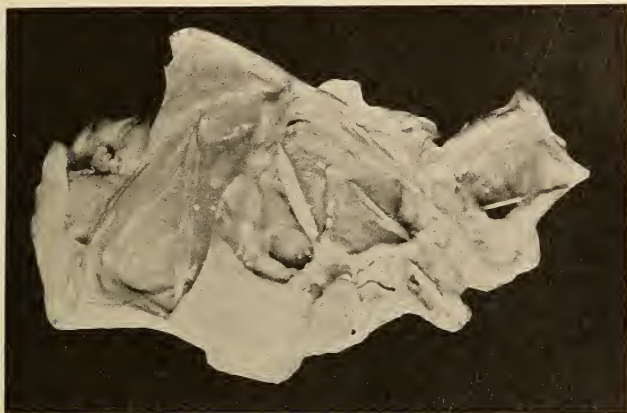
better point of operation, as it gives just as good an opportunity for irrigation and a better one for drainage. This of course presupposes that disease of the uterine appendages has been excluded—a diagnostic feat which is rarely accomplished. The opening should never be made in the rectum, as has been proposed, even though the abscess be pointing there. The abscess-cavity can neither be

irrigated easily through the rectal opening, nor can fecal matter be prevented from entering into it. Even where the opening occurs into the rectum spontaneously, it is slow to close in cases in which it ever does so. Where the opening is higher than the sacs, it is practically impossible to prevent fecal matter from entering, in which case closure is hopeless. There is one almost insurmountable obstacle to this method of treating pelvic abscesses, barring exceptional cases. It is rare that one is able to say whether or not the ovary or Fallopian tube contains pus. Should either do so, a possible subsequent abdominal section would become necessary, and it would then be complicated by the fistulous opening, which is always serious and which might prove fatal. As a matter of fact, the cases of pelvic abscess without ovarian or tubal suppuration are rare, and the inferences are all in favor of there being involvement of these organs, especially when the etiology of the disease is taken into consideration. In view of these facts, the proper treatment of pelvic abscess is usually by abdominal section, under which circumstances the parts can readily be explored, the exact pathological condition noted, and the appropriate treatment applied. The operation from above amounts to little more than opening an abscess, and the certainty of complete evacuation that it gives the operator and patient is a great desideratum.

Where the pus is confined in the Fallopian tube or ovary it has been recommended that vaginal puncture be practised for its evacuation. This method of treatment is so full of objection that it is best never to recommend it. Where vaginal puncture would probably be the better procedure for unskilled hands in a general pelvic abscess, especially one which required such immediate evacuation that a skilled operator could not be obtained, it is not the proper procedure in abscesses confined to the uterine appendages and the lymph immediately surrounding them. As has been already said, this variety of pelvic suppuration is rarely confined to one cavity, but consists of a number of small pockets, none of which communicates with the others. The Fallopian tube itself may contain as many as three distinct and separate pockets; the ovary forms a cavity of its own, and two or more pockets are often found in the lymph in which the Fallopian tube and ovary are buried. The chances of more than a partial evacuation of the pus being obtained would be very scanty indeed. This objection has been recognized even by the advocates of this method of treatment, and for the purpose of

overcoming the difficulty they have gone so far as to advise that the abdominal cavity be opened, the parts explored, the various abscesses located, and each punctured in turn from the vagina. If the abdominal cavity be opened, it would seem the height of folly not to complete the operation. But even with the abdomen opened it is at

FIG. 277.



Showing Multiple Abscess-cavities in a case of Pyosalpinx, demonstrating the uselessness of the treatment of tapping and draining.

times absolutely impossible to locate all the abscess-cavities before the parts are enucleated. Even in the few cases in which the pus could be thoroughly evacuated the broken-down abscess-sacs, cheesy Fallopian tubes and ovaries would remain behind to cause the patient a long chronic invalidism, should she ultimately recover. The best results which one could hope to obtain from this method of treatment would leave the patient in exactly the same condition as a woman who has suffered from a pelvic inflammation, and after its subsidence had been left in a condition of chronic interstitial salpingitis and ovaritis. She would ever after carry a disorganized Fallopian tube and ovary, and would be liable to recurring attacks of pelvic inflammation, any one of which might result in suppuration or in death. Purulent salpingitis and ovaritis, unless they end in death in from a few days to a week, are chronic conditions, and give ample time to allow the physician to obtain competent assistance for performing an abdominal section.

The treatment of those rare accumulations of pus within the pelvis which are extraperitoneal, and which do not involve the uterine appendages, differs in no way, in its first steps at least, from the treatment of the intraperitoneal abscesses. It is impossible to make a diagnosis of this condition prior to an abdominal section. When the abdomen is opened and the abscess-walls are found to be movable enough to be brought into the abdominal incision, it is best to aspirate, empty the sac thoroughly, irrigate the cavity with hot water, stitch the opening in the sac to the abdominal incision, and place a drainage-tube into the cavity.

Should it be found, as is usual, that the sac could not be brought sufficiently high to be stitched into the abdominal wound, a vaginal incision should be made, the pus evacuated, and the drainage established from below. Until the abdomen has been opened and the diagnosis established this treatment manifestly is improper unless involvement of the Fallopian tubes and ovaries can with reasonable certainty be excluded. Should it be thought desirable after the diagnosis has been established, a second incision could be made above Poupart's ligament and the abscess-cavity reached by dissecting down into the cellular tissue below the reflexion of the peritoneum, pushing the peritoneum forward, as in operations on the bladder or for ligating the iliac vessel, and in this manner reaching the accumulations. The vaginal opening, however, where possible, is to be preferred.

The ultimate treatment of pelvic inflammation is abdominal section in those patients who do not fully recover from the primary attack, and are left with their uterine appendages so diseased and disorganized that the symptoms produced by their presence either threaten life or so disable the woman as to incapacitate her for her daily vocation, and render her life a burden. It matters little whether pus be present or not, as many women suffer more from chronic interstitial salpingitis than they would from pyosalpinx or ovarian abscess. It would be well in the case of many patients, where there is no pus, to first try the medicinal treatment already described, but in this we are forced to make a distinction between the poorer and better-class patients. It has often been objected that no such distinction should be made, but it is well known that a given amount of involvement and destruction in a woman who can afford to undergo the time, trouble, and expense of a necessary course of treatment will give little or no permanent trouble, where a similar



involvement in the case of a woman who is not able to afford the treatment will render her life miserable and will give rise to recurrent attacks of peritonitis, each one increasing the local condition and endangering the life of the sufferer. Even were they both to suffer the same amount, the rich woman can afford to go to bed and become a semi-invalid, while the same thing to the poor woman often means starvation for herself and children, or the poorhouse. Though the operation is a dangerous one, the physician is justified under such circumstances to counsel a poor woman to take the risks, with the chances of regaining her health and putting herself in a condition to bear the burden of life, where he would probably hesitate to advise the well-to-do patient to undertake the operation—not, at least, without a long and thorough trial of the medicinal—if it may be so called—treatment. If a patient's symptoms can be considerably ameliorated by treatment, she will often prefer to bear the lesser ills of her condition, than what to her are the greater ills of a surgical procedure. Unless a woman is subject to recurrent attacks of peritonitis, the disease may be left *in situ* without any danger to life, provided always that pus be not present: in these cases it is simply a matter of comfort or discomfort with a patient. Many of them suffer so much pain that they will accept an operation as soon as it is proposed to them, it matters little what the risk is, while in the case of others the idea of an operation is so horrible that they will rather bear any amount of suffering than even consider the radical procedure. The question of operation is one which must be left for the patient's decision, the facts having been placed fairly before her. The dangers of an operation for pelvic inflammatory disease in the hands of trained gynecologists are not much greater than those which attend each severe recurring attack of peritonitis. It is not possible to say just what the death-rate amounts to, but an honest investigation would find it not much below 10 per cent. in the hands of the many. In the hands of a few it reaches a lower limit. The fact that the woman is having recurrent attacks of peritonitis is one of the strongest indications that an operation for the removal of the appendages is required. It is not possible to lay down any hard-and-fast rule by which one may be guided in deciding for or against an operation; each patient presents her own individual peculiarities, which must be taken into consideration. It can only be said that so long as the diseased appendages remain in the pelvis the woman is not cured: she is only relieved



for the time, and at any moment a new attack of inflammation may be lighted up and the original condition be reproduced.

*The Operation.*—Abdominal section is the only method of removing the uterine appendages in pelvic inflammatory diseases, whatever may be said of their removal by other methods for other conditions. Their removal by the vaginal operation is extremely difficult and in many cases would be impossible. The operation is divided into two stages: the opening of the abdominal cavity, and the removal of the appendages. The preliminary step, opening the abdominal cavity, is common to all abdominal operations, and will be found described in the chapter on Technique. There is no danger to be met with until the peritoneum is reached, and then only in case there is adhesion of the omentum or intestines. This fact can readily be determined by picking up the peritoneum between two pairs of hemostatic forceps, and rolling it between the fingers. The merest nick will allow the air to rush in, when if the intestines are not adherent they will drop back into the abdominal cavity. If either the omentum or the intestines are adherent to the parietal peritoneum, they are to be separated carefully by gradually inserting the finger between them. The omentum may be found adherent over the inlet of the pelvis and greatly thickened by inflammatory infiltrate. If such be the case, it must be freed gently with the fingers, care being taken not to tear the bladder or the adherent loops of intestines. It is usually easy to begin at the lower edge of the omentum to free it, working upward from the pelvis toward the umbilicus. When it is tightly adherent to the bladder and its lower border cannot clearly be defined, it is well at times to begin above and work down toward the pelvis. The finger should be passed high enough in the abdominal cavity to reach a point where the omentum is free; then, with the finger between it and the intestine, it can be separated with more safety than from below: if when the bladder is reached there is any uncertainty as to where that organ ends and the omentum begins, as is at times the case, the apron can be ligated and separated at a safe distance above the doubtful point.

If when the omentum is loosened it is found that it is sufficiently torn to cause free bleeding, the oozing points should be caught up with a pair of hemostatic forceps and ligated. Should there be a number of bleeding points, time will be saved if a ligature be thrown about the omentum above these and the included

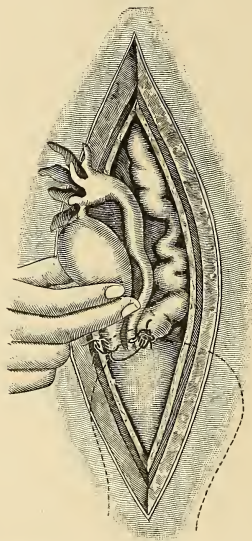
portion amputated. This is of especial importance and advantage if it is thickened by inflammatory deposits. After having disposed of the omentum, the intestines must next be dealt with. If they are unadherent, the finger passes down through them into the pelvis, locating first the uterus, and then the Fallopian tubes and ovaries. Should the intestines be found adherent, they must first carefully but completely be freed from all points of attachment. The adhesions may exist at but a few points, and easily be broken; on the other hand, they may be most extensive, and so solid that separation can only be accomplished with great difficulty and danger of rupturing the bowel-walls. Every loop of intestine which overhangs the pelvis, even the vermiform appendix, has been found to be involved in the general mass. The separation of these, especially if deep in the pelvis, is much facilitated by using the sight in addition to the touch. One of the great advantages of this is that the operator can be absolutely sure of what he is dealing with, and can see any commencing tear in the bowel-wall in time often to avoid a serious injury. The elevated hip—Trendelenberg—position allows the use of both touch and sight, and any surgeon who would willfully neglect the advantage to be derived from the combined use of these two senses does not do his whole duty to his patient. It is in this point of separating adherent intestines deep in the pelvis that the position gives its greatest advantage and becomes invaluable. The adhesions are freed by one finger being gently but firmly inserted between the first knuckle of intestine which is adherent and the organ to which it is fast. A to-and-fro motion will often succeed in loosening it when a steady pressure at one point will accomplish nothing. If the adhesion is stubborn at one point, the finger glides to another and another, until it finds a weak point from which to begin: after the beginning is made the rest is comparatively easy. At times it will yield easily on top; at others the first point of weakening will be found by passing the finger to the sides or even under the part. As each knuckle is freed it should be brought into the abdominal incision and carefully scrutinized. The points at which the adhesions existed will be found stripped of their peritoneum: if these points are small and not bleeding, they may be ignored; if bleeding freely, a few superficial stitches of silk or catgut will bring the edges of the peritoneum together and stop all flow. Exposure to the air for a short while may in itself stop it. If the serous and muscular coats are both torn through, stitches should be so placed

as to turn the doubtful point into the bowel, and any possible danger of future perforation at these points will be obviated. When the intestines are all freed and properly treated, they, together with the omentum, are crowded back toward the diaphragm and a large sponge placed in the abdomen, so as to keep them out of the pelvis while the operation is completed: the sponge does the additional duty of absorbing any blood or septic material which may flow toward the abdominal cavity during the course of the subsequent manipulations. Should the bladder have become injured, it should be repaired before proceeding further. Each and every step of the operation is to be completed fully before proceeding to the next, so that no point in the technique may be forgotten in the final steps of the operation, or complications will arise to embarrass the subsequent steps. It is well to locate and note the condition of both appendages before beginning their enucleation, and usually it is best to free both of them and the uterus before beginning to place the ligatures. If this be done, the parts can be brought more fully and easily into the abdominal incision, and there will be less likelihood of the first ligature becoming loosened while adherent parts are being separated on the opposite side. In the enucleation the finger glides about over the parts until it finds a weak point or a point at which it can be passed down deeply into the pelvis. It is essential that this should be posterior to the broad ligament, between it and the sacrum. The Fallopian tubes and the ovaries are situated on the posterior surface of the broad ligament, and the adhesions will almost always be found at this point. The finger should glide between the appendage and the sacrum. It is well where possible to follow the curve of the sacrum, keeping the palmar surface of the finger—or fingers if two be used—toward the pubis, sweeping the finger from one side of the pelvis to the other and in this manner freeing all adhesions to this bone. This will allow the fingers to pass under the ovaries, tubes, and uterus if it be retrodisplaced, and they can be stripped loose and lifted out of the pelvis with comparative ease. The aim should be to get the finger to the lowest point in the pelvis and work upward, and not from above downward. However, at times one is forced to work first at one point, and then abandon it and go to another and another, coming back finally to the original one. It is only by educating the fingers to the work that it can be performed accurately. In making the enucleation care should be taken to do as little damage as possible to the broad

ligament, as it bleeds freely wherever injured. It may be necessary at times to ligate the one side before enucleating the opposite one, on account of the bleeding. If this should be the case, care must be taken not to loosen the ligature while completing the work. As soon as the appendages and uterus are freed the ligatures are to be placed and the diseased parts removed. The Fallopian tube and ovary are caught firmly in one hand and drawn well through the abdominal incision, while the other hand passes the pedicle staff containing the ligature through the broad ligament, it being well to pass it below the loop of the round ligament, which will readily be observed on the anterior aspect of the tense broad ligament. If this be done and care be taken not to cut the loop of the round ligament when the Fallopian tube and ovary are removed, there will be less danger of the ligature slipping from the stump. As soon as the ligature staff has perforated the broad ligament the staff is withdrawn and the silk left *in situ* as a double ligature; the double end is then cut, and hangs as two separate threads perforating the broad ligament. The two strands of silk are so twisted that when their respective ends are tied, one around each half of the mass, they form a figure-of-eight, each half compressing one-half of the pedicle, and the two halves being drawn closely to each other. While placing the ligature the broad ligament should be held well up into the wound, but as the knots are tied tightly, the assistant who is holding the mass should relax his hold and allow the broad ligament to retract, else when the mass is cut away there will be a strong tendency on the part of the broad ligament to pull down through the ligature, thus causing hemorrhage. Care is to be taken that the Fallopian tube is included in the ligature up to the uterine cornua. In some cases it is necessary to include uterine tissue in order to get a pedicle healthy enough to hold the ligature without cutting through, and at times it cannot be done even then. Frequently the ligature cuts through the pedicle like a knife, completely amputating it. It becomes necessary then to pass a ligature, by means of a curved needle, deep into uterine tissues at the cornua in order to control the bleeding. The same procedure may become necessary on the side of the pelvic wall. In such cases the proper treatment is the complete removal of the uterus, together with the appendages. Patients with such lesions, when the appendages alone have been removed, are prone to return for treatment, suffering with leucor-

rheal discharge, pain, and continued bleeding: the uterus in such cases is often found to be still enlarged, and the writer has on several occasions been compelled to remove it in order to accomplish a cure. When the uterine appendages have been sacrificed the uterus is a useless organ: in case its retention should necessitate drainage on account of its mutilated and torn condition, in case its tissues be contaminated so as to threaten a subsequent or immediate infection,

FIG. 278.



Ligation by Figure-of-eight Ligature of the Fallopian Tube and Ovary.

in case it be so enlarged and diseased as to seem fairly probable that in future it will be the source of disagreeable or dangerous symptoms to the patient, it may be removed by intra-peritoneal amputation without hesitation. The ultimate results following the hysterectomy will be in a large number of cases superior to those following double ovariectomy alone.

The Staffordshire knot, or the so-called Tait knot, is an exceedingly dangerous one, and should be avoided, especially by beginners. The knot is so complicated that it is difficult to tie, and should any



one part of it be applied inaccurately and lightly, the whole loop is liable to become loose. Occasionally the pedicle is so large that it is not safe to include it all in one ligature. It is then best to tie in sections, quilting it from side to side as the cobbler does in his work. When the ligature has been firmly secured, the Fallopian tube and ovary are cut away, leaving sufficient of a button to ensure that the ligature will not slip off. After cutting away the appendage the stump should be seared with a Paquelin cautery as an antiseptic precaution. There is always a small portion of the lining membrane of the tube protruding from the centre of the stump often containing septic matter, which it is much safer to destroy than to leave free in the torn and denuded pelvis. When the ligatures are tightened, usually all free hemorrhage ceases and the only bleeding is merely an oozing, which will stop of its own accord in a short while. It may be advisable to place a ligature about some point which bleeds with especial freedom, but usually one or two of these at most are all that will be required. The points which will be most persistent and troublesome are those on the uterine surface. Wherever they are, if they are picked up with a pair of hemostatic forceps, and a ligature carried under them with a curved needle, they can readily be controlled. During the enucleation there should be no hemorrhage which is alarming, and generally it is better to ignore entirely what there is and finish freeing the adhesions with the certainty that the bleeding will end as soon as the ligatures are secured about the pedicles. Should the bleeding become alarming, it is because the ovarian artery has been severed, and it is best to secure the vessel by passing a ligature around it. If a needle be passed through the broad ligament near the pelvic wall and the ligature secured, and another one through the broad ligament near the uterus and secured, the vessel will be caught at both ends. The enucleation may then be finished and the mass tied away in the usual manner. There is neither necessity nor occasion for packing the pelvis with gauze or sponges to control hemorrhage during the course of the enucleation: such a procedure is not needed in the case of venous bleeding, and can only delay and impede the operation, while in arterial bleeding it will only control the hemorrhage as long as the pressure is kept up. The bleeding vessel must be ligated as soon as the gauze is withdrawn, and the result of its use is simply the loss of valuable time.

If during the course of the enucleation the Fallopian tube or

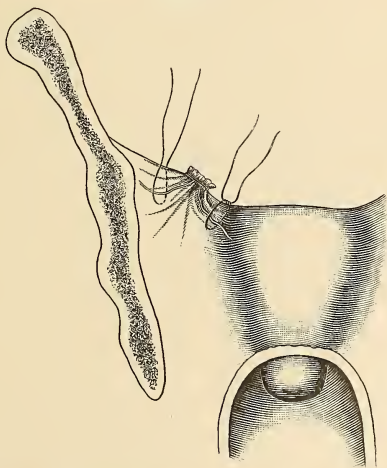


ovary, or both, be found distended with fluid, either purulent or otherwise, it may be well to empty them with the aspirator, so as to avoid their rupture during the operation, and consequent soiling of the torn and bleeding parts with septic matter. If possible, however, it is better to remove the tumor without emptying it, as an enlarged ovary or Fallopian tube is easier to handle and enucleate than a small or collapsed one: care should be observed, however, not to rupture it. Should it rupture and the parts become bathed with the contents, or should one or more pus-pockets be found in the lymph surrounding the appendages and evacuated into the general pelvic cavity, the parts must be washed out thoroughly and all traces of the fluid removed. If the intestines and omentum have become soiled, they must also be washed carefully. For this purpose a long-nozzled irrigator is carried to the bottom of the pelvis, and several gallons of hot water are passed through it. To carry out this procedure two fingers of the one hand are placed in the upper angle of the abdominal incision to hold the intestines back toward the abdominal cavity; the nozzle of the irrigator is then pressed toward the lower angle of the incision; a funnel is thus formed through which the water from the bottom of the pelvis gushes freely, bringing with it all the pus, blood, and other débris which has been left there. The heat of the water acts in addition as a good hemostatic to the oozing points, and tends also to combat any threatened shock. While the irrigation is being carried out the fingers should play freely among the intestines, washing them thoroughly. The use of Trendelenberg's posture has in great measure done away with the necessity for irrigation. With this position the whole pelvis and all its contents are so thoroughly exposed to the eye that all débris can be removed with a sponge. Where irrigation is used the patient, for obvious reasons, should never be in the Trendelenberg posture. Before closing the abdominal wound a last look at the stump should be taken in order that any tendency to slipping or loosening of the ligatures may be noted and corrected. Should there be any doubt about their perfect safety, a ligature can readily be thrown around the ovarian artery on each side of the stump with the aid of a curved needle, thus rendering assurance doubly sure (see Fig. 279). It is seldom during the course of an operation of this kind that the ureters are injured: such accidents have happened, however, and this possibility must always be borne in mind. (See Injuries to Ureter, chapter on Diseases of Bladder, Urethra, and

Ureters.) When large surfaces of peritoneum have been denuded and there is free oozing, when septic matter has soiled the seat of the operation, or where a bowel has been badly damaged, drainage is at times indicated. Drainage is probably more often required in this class of operations than in any other in abdominal surgery. A drainage-tube of glass or gauze is passed to the most dependent point in the pelvis and brought out through the lower angle of the abdominal incision. The incision is closed, preferably with a silkworm-gut suture, although the character of the suture is immaterial, provided it is surgically clean.

Frequently during the course of an operation the question arises whether or not certain parts should be removed. If it be necessary to remove the Fallopian tube on one side, its accompanying ovary had better go with it, and *vice versa*. Either Fallopian tube or ovary by itself is useless, and both are possible sources of future

FIG. 279.



Stump after removal of Uterine Appendages, showing double ligation of Ovarian Artery.

danger. Should the appendages on one side be healthy, it is unwise to remove them together with the diseased ones on the opposite side, for the reason that it renders the woman sterile and brings on the menopause with all its attending nervous phenomena. In spite of

the fact that some good surgeons contend for the removal of both ovaries, it is better that the patient take the risk of a second operation for the removal of the remaining one if in the future it become diseased. If the Fallopian tube is not already diseased, there is no good reason that it will become so if after recovery from the abdominal section the lining membrane of the uterus be treated and the endometritis cured. It becomes necessary, in any event, to adopt this course in many cases after the appendages have been removed, in order to secure a complete recovery. The disease originated in the uterus, and the fact that it has spread to the Fallopian tube and the pelvic peritoneum is no reason why it does not still exist intra-uterine. As a matter of fact, many of these patients are not cured until the womb has been curetted and treated by alterative and stimulating applications.

The question often arises as to whether an operation should be performed in the presence of an acute peritonitis. If one have the choice, it were possibly best to operate in the quiescent state; but if any indications for a speedy operation exist, no hesitation need be had on account of the inflammatory attack; its cure will be assured on the removal of the appendages. The large masses of plastic lymph which accompany it are broken down and disappear in the course of the enucleation: within twenty-four hours the pulse and temperature, which were high at the time of the operation, approach the normal, and the patient convalesces within forty-eight hours. Neither need menstruation be a bar to operation. When both appendages have been removed, there is always a spurious menstrual flow within two days after the operation. The only possible disadvantage would be that the operation might be slightly more bloody on account of the pelvic congestion—not, however, more than if an acute inflammatory attack were in progress.

*Vaginal Hysterectomy* is preferred by some surgeons in the radical treatment of pelvic inflammations. The operation is in every way inferior to abdominal section in that it, of necessity sacrifices the uterus, is a more difficult and prolonged manipulation, is more uncertain in the removal of all portions of diseased organs, is inapplicable to certain phases of the disease—for instance, complicating vermiform appendix inflammation—and in the fact that injuries to the hollow viscera, which occur far more frequently by the vaginal route, are incapable of being repaired short of an additional abdominal section.

PLATE XXVIII.

FIG. 1.

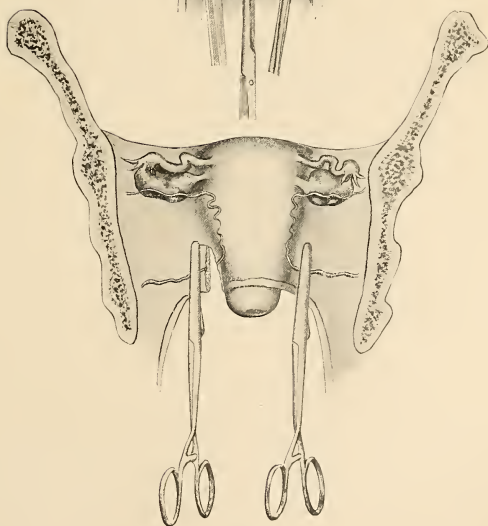
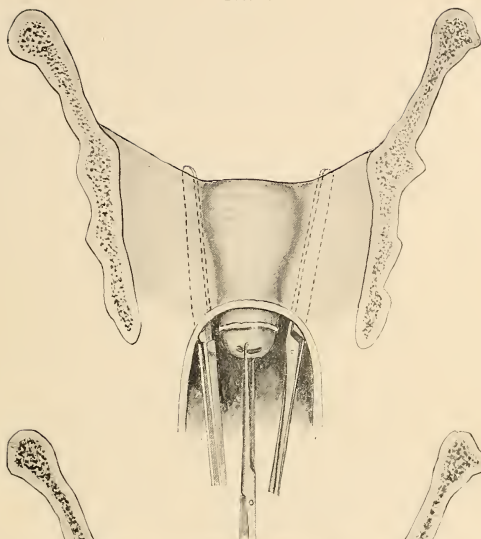


FIG. 2.

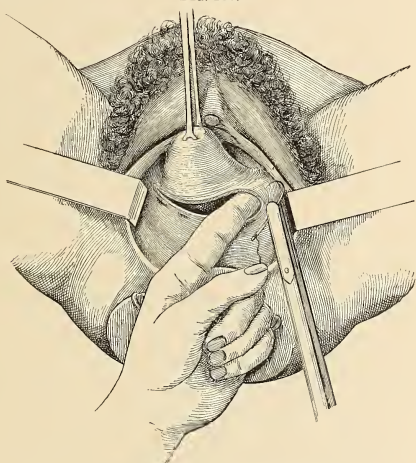
FIG. 1.—Vaginal Hysterectomy with Clamps. Single-clamp operation.

FIG. 2.—Vaginal Hysterectomy with Clamps. Multiple-clamp operation : first step.



Operators who make frequent use of the vagina as a route to the treatment of diseases of the pelvic organs adopt this method, not only for cases of pelvic inflammation, but for patients suffering from uterine and ovarian displacements, ovarian neoplasms of small or even moderate size, and small fibroid tumors, as well as various other pelvic ailments.

FIG. 280.



Vaginal Hysterectomy: opening the posterior cul-de-sac, and suturing the peritoneum and the mucous membrane together to control bleeding.

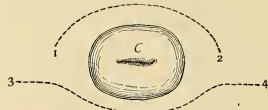
Whilst many gynecologists have fixed upon the vagina as the best channel through which the pelvic organs should be treated surgically, yet unanimity does not exist with regard to the technique of the operation. Some surgeons, at the head of whom stand Péan and Richelot, secure the broad ligaments, either in section by several catch forceps or as a whole by a single clamp on either side. Many, perhaps the majority of American surgeons, have adopted the multiple clamp procedure. This is usually a more rapid mode of operating than by the ligature, and the clamps are kept on only from thirty-six to forty-eight hours.

It having been determined that there exists disease of the uterus and adnexa of a degree sufficient to warrant their removal through the vagina, the operator proceeds in the following manner:



The patient is placed in the lithotomy position. The uterus is curetted and irrigated, but not packed with gauze. The cervix is grasped by a very heavy pair of traction forceps. A firm hold upon the cervix is essential. The posterior cul-de-sac is opened in the same manner as already described and illustrated in the article on posterior vaginal section (see Figs. 268-273). The operator then makes a thorough digital examination of the pelvic contents. If the adnexa are found adherent, they are loosened before any attempt at extirpation is made. At times it will be found impossible, owing to their high attachment, to reach the adherent adnexa. When the operator has loosened all adherent structures by means of his finger he proceeds to separate the uterus from

FIG. 281.



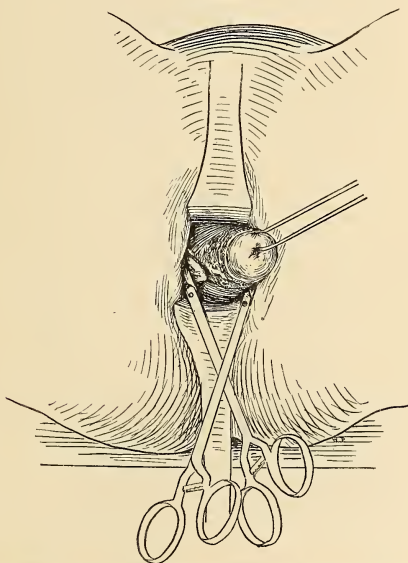
1-2, the anterior incision; 3-4, the posterior incision; C, cervix. It will be noticed that the incisions do not meet.

the bladder. With a pair of stout scissors a semicircular incision is made through the mucous membrane at the cervico-vaginal junction, the operator cutting toward the cervix. This incision on each side stops short of the median line. Still making firm downward traction upon the uterus, the operator pushes up the bladder away from the uterine tissue, being careful to keep his finger points and nails pressed hard against the uterus in order to avoid tearing the bladder. If it be possible to do so, the bladder should be separated entirely from its anterior attachments to the uterus and the peritoneal cavity entered in front. When the operator has succeeded in doing this, the middle finger of each hand is introduced between the bladder and uterus, while the index fingers are inserted into the cul-de-sac. Upon separating the hands to each side, the loose tissues on each side of the uterus are shoved away, such as the bladder and ureters. This is done to the extent only of freeing the uterus at the sides. The uterus will now hang by its broad ligaments, round ligaments, and a narrow strip of vaginal mucous membrane upon each side. The arterial supply has not been interfered with or disturbed. Introducing the middle and index fingers of the left hand so as to grasp between them the broad ligament of the left side,

the operator shoves the tissues at the left of the uterus outward, and seizes with the hysterectomy forceps the uterine artery between the uterus and his fingers. The same thing is done on the other side. These two forceps will secure the uterine arteries. With scissors the tissues between each forceps and the cervix are severed almost to the point of the forceps.

So far, the operation has been comparatively easy. The next

FIG. 282.

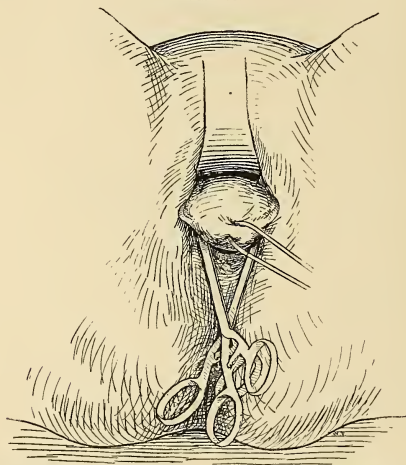


The cul-de-sac has been opened and the bladder dissected from the uterus. The uterine arteries are grasped by forceps and the cervix has been dissected from the lateral stumps. (Photograph of operation.)

step is to secure the ovarian arteries outside the diseased adnexa. All retractors are removed. If the operator can anteverte the uterus, he does so. As the corpus uteri appears beneath the bladder, the latter is lifted up with the fingers or a short speculum and a firm grasp is taken in the anterior uterine wall with traction forceps. As the corpus uteri comes still farther into view, another pair of traction forceps grasp it above the first pair and pull it still farther forward. The operator removes the first pair of traction forceps

and catches the body of the uterus above the second pair. In this way, step by step, the corpus uteri is made to emerge beneath the bladder, so that the fundus and tubes may be seen. In accomplishing this, all down-traction upon the cervix must be avoided. In fact, the body of the uterus will rotate forward more readily if the cervix be pushed up with the fingers. When the operator has the tubes in view, the adnexa upon the woman's left are pulled beneath the bladder through the vesico-uterine incision until they

FIG. 283.



The cervix has been shoved up so as to permit the operator to drag the fundus out beneath the bladder. Both cornua uteri are shown with the attached tubes. (Photograph of operation.)

lie in front of the uterus. Standing up, the operator grasps the broad ligament outside the ovary with the thumb and index finger of the left hand, the index finger being posterior to the ligament, and applies the hysterectomy forceps from above downward, so as to grasp all the broad ligament between its upper edge down to the tip of the forceps on the uterine artery. The uterus is then cut loose upon this side. After freeing the uterus upon one side, the adnexa of the other side are pulled in front of the uterus, the fingers grasp the broad ligament, and the broad ligament is clamped from above downward. The uterus and adnexa are now cut away.

If it appears more convenient to retrovert the uterus, this can be

PLATE XXIX.

FIG. 3.

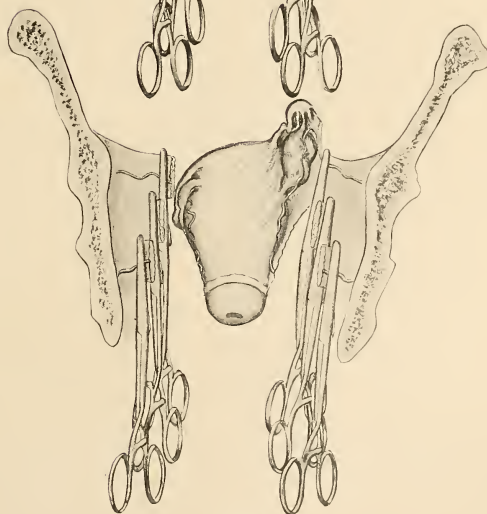
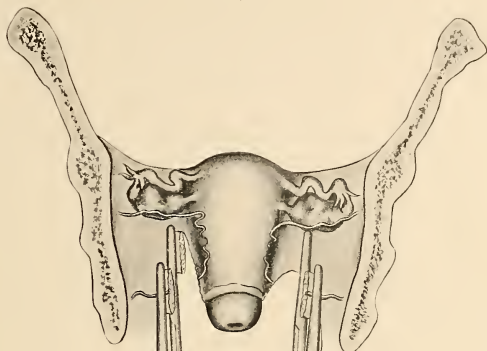


FIG. 4.

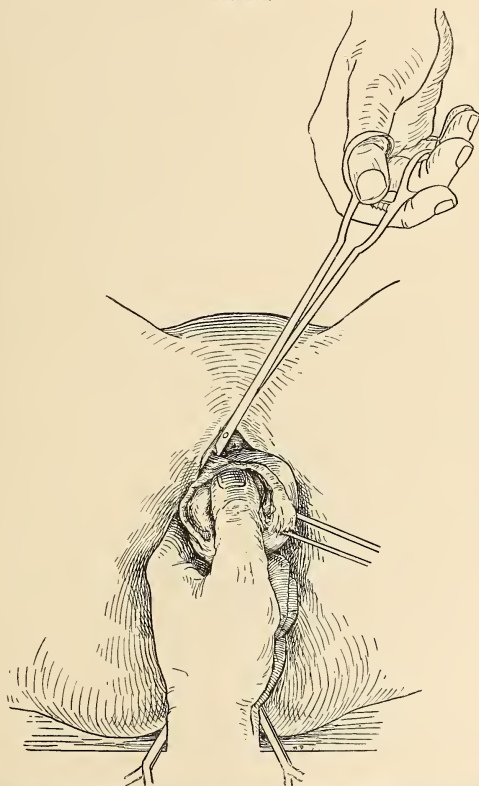
FIG. 3.—Vaginal Hysterectomy with Clamps. Multiple-clamp operation: second step

FIG. 4.—Vaginal Hysterectomy with Clamps. Multiple-clamp operation: third and final step.



done by starting the process with a heavy male sound introduced into the uterus, and then progressively grasping higher and higher upon the posterior uterine wall with blunt traction forceps. Hav-

FIG. 284.



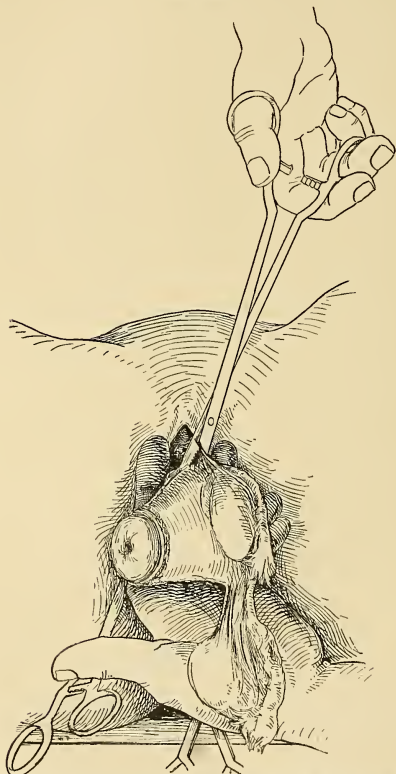
After delivering the fundus, the entire uterine body is pulled to the right in order that the left adnexa may be seized. The operator's thumb rests on the ovary, while his two first fingers grasp the corpus uteri. The forceps are being applied to the right ovarian artery. Notice the absence of retractors. (Photograph of operation.)

ing brought the fundus uteri out through the posterior cul-de-sac, the adnexa are pulled into the vagina and the ovarian vessels clamped.



Introducing two fingers of the left hand behind the uterus, the operator grasps the adnexa on the woman's left and pulls them down to a position posterior to the uterus, and places a pair of hysterectomy

FIG. 285.



Having clasped the right ovarian artery, the uterus is cut away upon that side. The operator rotates the uterus, so that the cervix is delivered and the posterior surface of the uterus presents. He grasps the left broad ligament between his index and middle fingers, and applies the forceps to the left ovarian artery. The method of applying these forceps is shown. (Photograph of operation.)

tomy forceps on the broad ligament from above downward in such a way that the tip of one blade of the forceps is felt by the palmar surfaces of the fingers which are holding the uterus and adnexa. Applying the forceps in this way, he avoids grasping a possible

prolapsed knuckle of intestine. This pair of forceps will secure the ovarian artery on the left side. The uterus is now freed upon the left side by cutting between the forceps and uterus with scissors. It is often necessary to use several pairs of clamps on each side of the uterus in order to secure the ovarian arteries. Every step of this work should be seen, even to the application of the forceps, so that the intestines may not be wounded. Having released the uterus entirely on one side, the operator grasps the adnexa upon the right with his left hand and pulls them downward and to the left, so that the adnexa and uterus lie in the hollow of the hand, the right broad ligament being grasped between the thumb and index finger. Standing up, the operator introduces the forceps from above downward outside the fingers which are holding the tissues, so as to grasp all that part of the broad ligament between the tips of the forceps on the uterine artery and the top of the broad ligament. The uterus is then cut away and removed.

It is while working to secure the ovarian arteries that the operator fully appreciates the advantages of having freed the uterus and adnexa from all adhesions before he applies any forceps upon the vessels. If he has failed to do this or cannot do it, he will find the operation most difficult. The one great essential to a smooth vaginal hysterectomy is to free the uterus and adnexa before hemostasis is begun.

The specula are next introduced. Holding the bladder up and depressing the perineum and posterior vaginal wall, the operator introduces a gauze pad into the pelvis and pushes the intestines away from the stumps secured by his forceps, so that he may make a careful inspection of the stumps and see if any bleeding is going on. If the adnexa have been thoroughly freed before extirpation is attempted, it will be seen upon completion of the operation that the bite of each pair of forceps is in the upper part of the vagina. No forceps, if possible, should ever be applied so as to project up into the pelvic cavity among the intestines. The gauze pad supporting the intestines is now removed, and a piece of iodoform gauze is inserted between the forceps and the wall of the vagina on each side to prevent pressure-slough. The operator now takes squares of iodoform gauze, each about two inches wide and three inches long, and introduces one piece along the side of the forceps on the left, a little above their tips. This piece of gauze is supported by a smooth, narrow speculum introduced to the right of it, the dressing forceps removed,

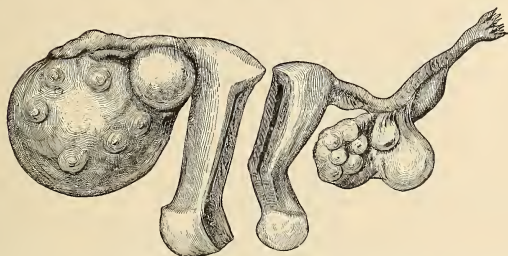
another piece of gauze introduced alongside the speculum, the speculum withdrawn, and this piece of gauze also supported; and in this way the operator proceeds from one side to the other, filling the opening in the vagina entirely with iodoform gauze, which projects a little above the points of the forceps. A few more pieces of gauze are introduced lower down in the vagina, so as to fill it to the vulvar orifice. Sterilized gauze is wrapped around all the forceps and tied. A self-retaining catheter is introduced into the bladder and pinned to a piece of plaster fastened to the skin above the pubes. The sphincter ani is dilated and the patient put to bed.

Sometimes, when the adnexa of one side are so firmly attached to the intestines, or are so large, or the vulva so small, that the operator cannot loosen both adnexa to his satisfaction, he may proceed as follows: If the difficulty be limited to one side only—for example, the right side—he may free the adnexa on the left side, secure the uterine arteries on both sides, and the ovarian artery on the left side outside the ovary and tube; he then cuts the uterus free on the left side. Having done this, he introduces a pair of forceps close to the uterus upon the right side where the adnexa have not been freed, and removes the uterus and adnexa of the left side, leaving in the tissues which embarrassed him. It will now be found that he will have room for removing under the guidance of the eye the remaining adnexa. In doing this the operator will secure the ovarian artery outside the ovary and tube, and this will render the pair of forceps which were applied between the uterus and right adnexa unnecessary, so they are removed.

If the tissues are very soft, so that down-traction cannot be made without the forceps tearing through, or if the adnexa of both sides be so firmly attached, or other difficulties exist which render it impossible for the operator to free the adnexa on either side, he proceeds as follows: Having entered the cul-de-sac and after separating the uterus entirely from the bladder, he secures the uterine artery on each side with forceps, and with blunt scissors splits the uterus in the middle line up its anterior face; as he cuts each fraction of an inch, it will be noticed that the cut surfaces turn out, and these he grasps on each side with blunt traction forceps and pulls down. Alternately cutting through the centre and going higher and higher up with his traction, the operator will arrive at the fundus uteri; he then splits the posterior surface of the uterus with scissors. Very little bleeding is produced, and only parenchymatous in volume.

Shoving the right half of the uterus and the right adnexa into the pelvis to one side, the operator proceeds with the enucleation of the adnexa on the woman's left, and, when he has them freed, nothing remains for him to do but to secure the ovarian artery on that side by applying forceps from above downward. The same thing is

FIG. 286.


 Ovarian cyst, cystic ovary, and uterus removed *per vaginam* by hemisection. Old nullipara.

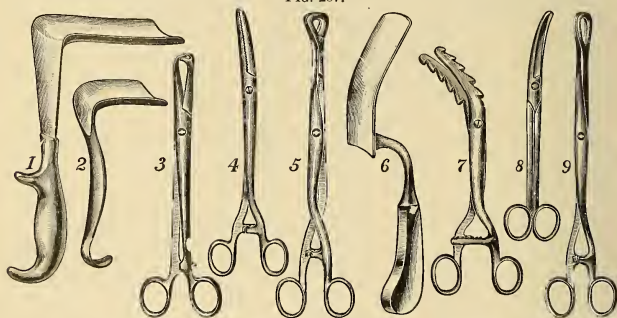
done on the other side. In other words, the operator, meeting with difficulties that he cannot overcome altogether, divides the difficulties by splitting the uterus.

When the uterus is very large, the operator may proceed as follows: Having opened both the posterior and anterior cul-de-sacs, he secures the uterine arteries with forceps. The cervix is now cut loose upon each side almost to the points of the forceps. It is now split bilaterally up to the point of the forceps. Grasping each flap with traction forceps, the operator amputates the anterior lip and seizes the stump, and the same is done with the posterior half. Or he may leave the posterior lip for traction purposes when the uterus is soft. He now splits the anterior wall of the uterus as high up as he can, and from each side, as he ascends, he cuts small triangular pieces of tissue, being careful not to wound the uterine-ovarian anastomosis on each side. If small fibroid nodules are met with in the uterus, they are dug out. Ascending the anterior uterine wall in this way, and removing cautiously all tissues to the lateral angles, the operator takes away piecemeal nearly all of the anterior half of the uterus. He has already secured the uterine arteries, and if he can grasp the ovarian now, he should do so and remove the rest of the uterine tissue, the adnexa being attended to later. The object of the morcellation is to enable the operator to reach the ovarian

arteries, and this he cannot do until he has removed all uterine tissue which blocks his way. In some cases quite large fibroid tumors are removed by the vagina.

Certain details connected with this operation may be elaborated. In the first place, special instruments are necessary, and chiefest of these are the hemostatic forceps. The bite should not be long—not over one and a quarter inches—and the points of the forceps should come together when the first catch is closed. The point of the forceps should always meet before the rest of the bite closes. This is very essential, otherwise the operator will find that when he crowds the forceps into the tissues and closes them an imperfect grasp is secured by the upper portion of the forceps, while the points do not

FIG. 287.



Instruments used in cul-de-sac exploration and vaginal hysterectomy.

constrict the tissues at all. This accident may cause the death of a patient from hemorrhage. No case should be put to bed after operation until the operator has seen the ends of every tissue he has severed and assured himself that there is no arterial bleeding.

If there be found a fistulous tract between a pus-tube or ovary and the rectum, sigmoid flexure, or small intestine, and this be so small that it can be sutured, stitches are to be taken in it. If the fistula be too large for suturing from the vagina, the operator should, after completing his vaginal operation and dressing the vagina, open the abdomen and repair the wounded bowel or vermiform appendix if that be seriously injured. Injuries to the bladder should be repaired at once.

If it is thought desirable before placing the packings, the forceps



PLATE XXX.

FIG. 1.

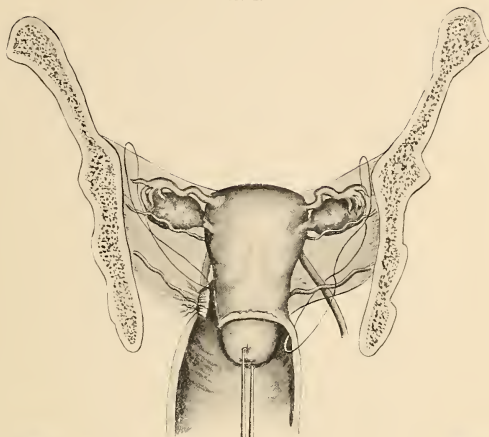


FIG. 2.

FIG. 1.—Vaginal Hysterectomy with the Ligature: first step.

FIG. 2.—Vaginal Hysterectomy with the Ligature: second step.





may be removed and replaced by ligatures, either silk or catgut. In this case the stumps are drawn well into the vagina and the dressings introduced as already described. Or if the pelvis be a non-infected one, the vaginal vault may be closed by sutures (Plate XXI. Fig. 4), which, passing through the stumps, hold them fast in the vagina and prevent their retraction into the peritoneal cavity. This is the better method of finishing the vaginal operation.

The dangers of vaginal hysterectomy, however performed, are sepsis, hemorrhage, vesico-vaginal or recto-vaginal fistula, and injury to the ureters.

Where both appendages have been removed, the menopause usually becomes established. There are, however, frequent exceptions to this rule, and patients return to the surgeon complaining that they are bleeding at regular intervals, and just as profusely as before. The cause for this has not been satisfactorily explained as yet. The explanation has been advanced that a small ganglion of nerves existed at the angle formed by the junction of the Fallopian tube and the uterus, and that there had been a failure to include and remove this ganglion with the appendage. Practical experience has long since proved the falsity of this theory. It has again been contended that an ovary—a third one—was left behind, but this has also been proved to be untrue: these cases of continued bleeding are quite frequent, while but few men have ever seen the mythical third ovary, in spite of the fact that an eminent German authority states in his book that it is possessed by about every tenth or twelfth woman. Some few of these patients are relieved of the flow by a thorough curetting of the endometrium: in others this procedure has no effect. Usually, after a shorter or longer interval, menstruation, which at first remained fairly regular, becomes scanty, and finally disappears, the cause for its continuance remaining a mystery.

The relief following the removal of the uterine appendages is not always the same, nor is the best result obtained immediately. If it is only necessary to remove one side, the menstrual function continues much the same as usual, and many of the benefits of the operation are realized at once. Of course the aches and pains, which occur more from habit than from any real lesion, continue to a certain extent until the patient returns to a good condition of general health. This requires time and building up. Should both sides have been removed, all the nerve-symptoms of the menopause appear within a few weeks after the operation, and the

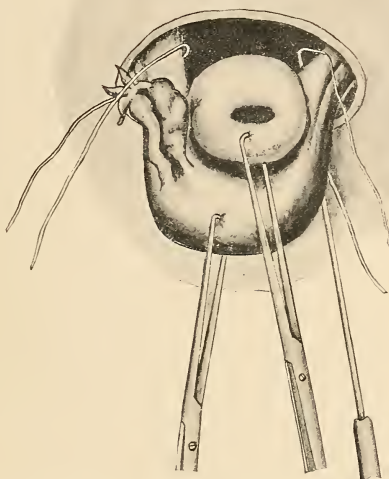
woman oftentimes feels worse than before the operation was performed. The menopause, which is artificial under these circumstances, usually assumes a longer and more stormy course than when the woman changes naturally. The best effects of the operation cannot be expected until this time is past, which may not be for a year or two. The immediate relief from pain, however, is marked, and, although the woman is not altogether well, she is relatively and comparatively so: where she was a chronic invalid before, she is now able to be about and attend to her daily duties. The great trouble with surgeons is that they expect too much from the operation, and lead their patients to do the same. This is a great mistake. So much local damage has been done by the inflammation, and the general health is so wrecked, that the woman will never again be the same well woman she once was: such a result is neither to be expected nor obtained in very many instances. An absolute cure should never be promised; only relative results can safely be counted upon.

The pain which so often remains with the patient after the operation cannot always be accounted for. At times the omentum or intestine may become adherent to some denuded spot or to the stump. The dragging, incident to the peristaltic action would then give rise to pain. Frequently it is due to intestinal colic or to the compression of the nerve-filaments by the ligature. In some cases it is impossible to account for the pain on any other ground than that it was not originally caused by the ovarian or tubal disease, but resulted essentially from a nerve-disease from the first. An operation for the removal of the uterine appendages for pain as the only indication is rarely justifiable. Whether or not there has been a pelvic inflammation, the surgeon should always be able to demonstrate positive disease of the Fallopian tubes and ovaries by a bimanual examination before counselling a surgical operation for their removal. The pain may be the result of a pelvic inflammation, but it does not follow that the removal of the appendages will cure this symptom, unless the appendages are diseased and can be shown to be the seat of the suffering.

Some of the worst and most hopeless cases of pelvic inflammation recover after an operation. This is particularly so in pus cases. It is surprising to note how quickly they rally even when they have appeared to be most desperate. For this reason no woman should be refused the chance of recovery because she may seem too far gone

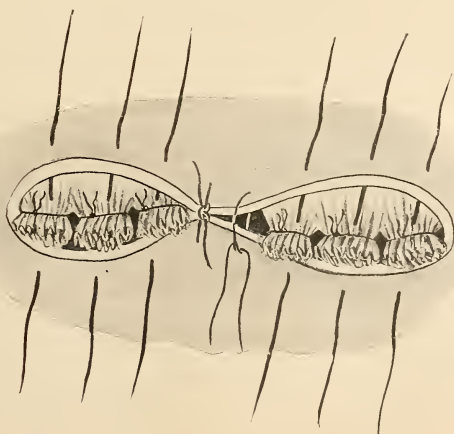
PLATE XXXI.

FIG. 3.

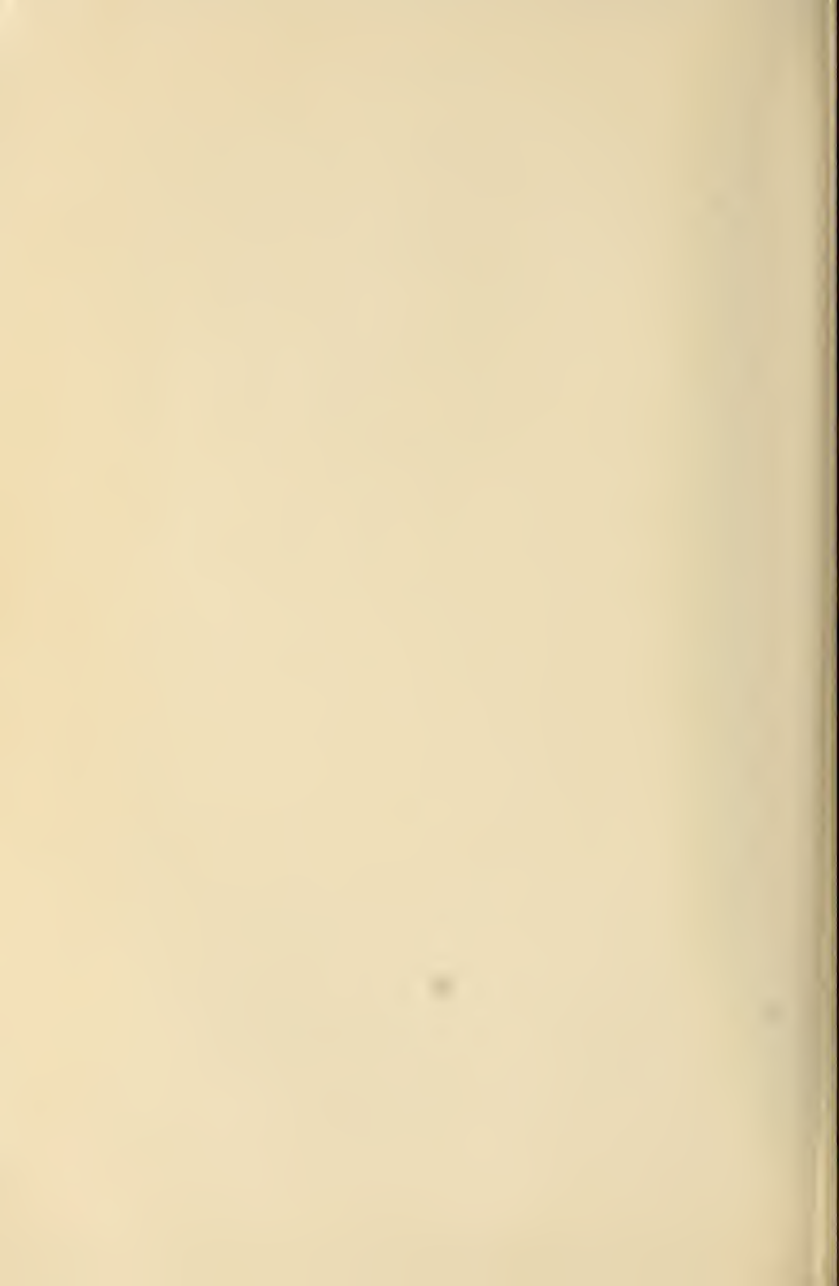


Vaginal Hysterectomy with the Ligature: third step. Fundus dragged into vagina prior to placing final ligature.

FIG. 4.



Vaginal Hysterectomy with the Ligature: stumps drawn into the vagina, with sutures in place ready to close the opening in the vaginal vault.



for relief: unless she is actually dying there is hope, and a conscientious surgeon should offer her the last chance, forlorn as it may seem. The operation often means little more than the opening of an abscess, but, whatever it amounts to, a short etherization and a short operation frequently makes the difference between life and death with a patient: what is done should be performed as quickly as is compatible with safety, and the patient gotten back into bed. Should the enucleation give promise of being a long or hard one, and the patient apparently unable to stand it, it were better to empty out the pus and place a drainage-tube, leaving the completion of the operation to some future time when the woman is better able to sustain the shock of the necessary manipulations.

From time to time different substitutes have been sought for the removal of the appendages in pelvic inflammation. It has been proposed to open the abdomen, break up all the adhesions, and allow the parts to remain *in situ*. Again, it has been stated that it was proper to free the adhesions of a Fallopian tube containing pus, and squeeze the pus into the uterus by stripping the tube with the fingers. The fimbriated end of the tube being cut away and its cavity washed out, the cut end is stitched into the abdominal opening or the mucous and serous membranes brought together over the denuded portion. All manner of such procedures have been practised in the name of conservatism, each and every one of them being, in fact, more tedious and more dangerous than the complete removal of the diseased and destroyed appendages. The only justification of such surgery would be subsequent pregnancy. As yet there is little reported which is encouraging from that standpoint. To open the end of the Fallopian tube, which Nature has sealed to prevent the further escape of infectious matter, is only to invite the infection of the whole pelvic if not abdominal cavity. Fortunately, Nature again seals the opening with plastic lymph within a few hours after it has been returned to the abdomen, and the whole procedure has been nullified so far as the results expected are concerned. Such surgery is useless in this class of diseases, and can only end in disappointed hopes. The moment the parts are returned to their position in the pelvis they re-adhere.

Is there, then, no hope of a cure for these women short of the removal of the appendages? If they are able to bear their sufferings until the change of life is established, Nature will effect a cure. Pelvic inflammatory disease is essentially an affection of youth and



middle age; it seldom occurs in virgins or after the change of life. After the menopause it gradually becomes inactive, and finally ceases to give rise to any symptoms. As to whether or not a patient be advised to wait for this natural cure will depend much upon her suffering, the length of time she has to wait, the condition of her general health, and her station in life. A well-to-do woman could readily tide over a few years more or less with comparative comfort and safety, while her less fortunate poor sister would be forced to call upon the surgeon for relief.

The changes which take place in a woman following the removal of both uterine appendages are the same as follows the natural change of life—none other, none less. The woman is sterile; she was usually sterile at the time of the operation, and would never have been anything else. Often the sexual appetite is increased; rarely diminished, as is commonly supposed. The increase is simply the return of the woman's natural condition. Her pain and suffering and ill-health had inhibited the sexual appetite; these being removed, the appetite returns in full force. Gradually over the course of years the appetite fades in exactly the same manner as it does following the natural menopause. In some women it is lost in a few years, in others not for many. The woman takes on a growth of flesh and becomes more matronly; otherwise there is no change—no coarseness, no growth of hair on the face, no harshness of the voice, no masculine appearance.

As a result of neglected pelvic suppuration, pus frequently finds its way to the surface and discharges; oftener the patient dies of exhaustion and septicemia before this result is attained. Fistulous openings may appear in the rectum, the small intestines, the vagina, the bladder, the perineum, the abdominal walls, and the gluteal region. If the abscess has been unattended with involvement of the uterine appendages, sinuses will probably close and all signs of suppuration cease. If, on the other hand, the appendages are involved in the suppurative process, as they most frequently are, the sinuses will remain open in spite of all that may be done by way of medical treatment; the discharges continue, and the patient gradually becomes more and more exhausted and emaciated, until she finally becomes bed-ridden, and dies after a long period of suffering and misery. The treatment of such cases is unpromising. Abdominal section with removal of the abscess-sac is the only alternative, however bad the case may be. When the pelvis has

been cleansed of the diseased appendages which form the focus of suppuration, there is of course a sinus opening into the pelvic cavity. This is a source of great and threatening danger to the woman for the first twenty-four or forty-eight hours after operation, but it is a risk which she must necessarily assume: there is no avoiding it. The sinus should be well irrigated from within the pelvis outward in whatever direction it runs, and it should be disinfected as thoroughly as possible throughout its whole course. If it passes through any considerable amount of tissue, it is well to introduce a drainage-tube into its outer end, so as to ensure the flow of suppurative material away from the pelvic cavity. The mouth of the sinus in the pelvis is to be thoroughly scraped, cleansed and closed by a few catgut stitches. Nature will in a few hours add additional barriers to any infection entering the pelvis by sealing the opening with plastic lymph. Should the opening be into the bladder or bowel, the edges of the perforation are carefully to be prepared and closed with stitches. It is possible that the condition of the bowels will be so bad that in the case of the small intestine a portion must be resected. When the opening is too low down in the rectum for closure, a drainage-tube must always be placed at the point of opening, and the bowels kept perfectly quiet with opium for three or four days, so that no fecal matter may escape before the opening is sufficiently closed by lymph.

It is possible in a goodly number of these extreme cases to get a good result, and when the patients do pass through the operation safely, it is surprising to see how quickly they regain their health up to a certain safe point. At times they are so badly wrecked that perfect recovery is a matter of years. The adhesions are so extensive and dense, the patient in such a low physical condition, and the damage to viscera so irreparable in many cases, that they are unable to stand the necessarily prolonged operation or they succumb to septic peritonitis. This, however, should be no reason for staying the surgeon's hand so long as he can give a reasonable chance of cure to a respectable proportion of such cases. These cases invariably die if left alone, and each one cured is a life snatched from the grave.

The sooner the general profession becomes thoroughly imbued with the vast importance of the whole subject of pelvic inflammation, and acts intelligently upon the principles here laid down, the sooner will we have to face a lesser number of such terrible examples of neglect and ignorance.

## ECTOPIC GESTATION.

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DEFINITION.—By the term “ectopic gestation” is meant a pregnancy situated outside the cavity of the uterus, and the title *ectopic* is preferred to that of *extra-uterine*, as including, also, pregnancy in the interstitial portion of the tube, which, while ectopic, is not outside of the uterus.

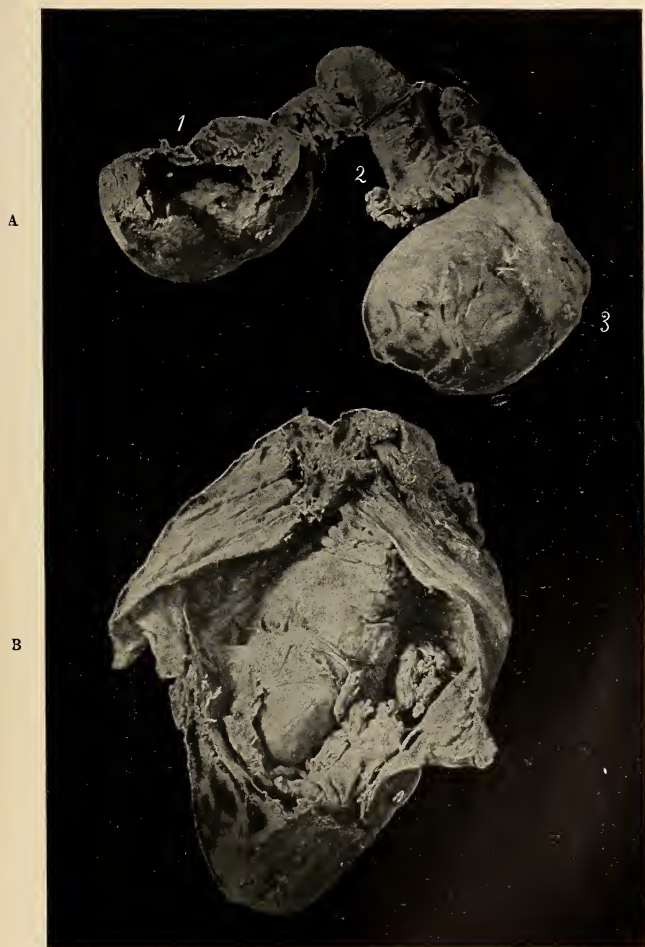
Cornual pregnancy will not be included in this article.

HISTORY.—We shall not enter into the history of the subject, save to say that Albucasis, in the middle of the eleventh century, described the first known case of ectopic gestation. For centuries it was considered one of the rarest of Nature’s freaks, but since March 3, 1883, when Lawson Tait of Birmingham, Eng., performed his first successful operation on a case of ruptured ectopic gestation, examples of this condition have been observed so frequently that the literature of reported cases is voluminous, and to Tait and his views of the etiology and treatment of pelvic hematocele are largely due our knowledge of the subject now before us. Instead of regarding the condition a rare one, we know now that it is comparatively frequent, and that every gynecologist in active operative practice must meet with several cases each year. Formad of Philadelphia, in a series of 3500 general autopsies, found 35 ectopic gestations.

The relative frequency of this condition at the present time, as compared with the past, simply means that we are now better able to recognize such cases; and many of the deaths formerly assigned to idiopathic peritonitis and to hematocele were undoubtedly due to ectopic gestation.

VARIETIES.—For all practical purposes we may regard the tube as the primary seat of the ectopic gestation. When the fimbriated extremity of the tube is adherent to the surface of the ovary and embraces one or more Graafian follicles, we admit the possibility, after rupture of the follicle, of impregnation of the ovum before it leaves the follicle, and its development within the ovary, constituting, in one sense, an ovarian pregnancy. Such an event, however, if it ever occurs, would be so extremely rare that it may be left out of consideration in a practical work like this and *ectopic gestation* be regarded as *originally tubal*.

PLATE XXXII.



Combined Ectopic and Intra-uterine Gestation; operation five months after marriage: A, tube and ovary removed at operation; 1, gestation-sac containing amnion and giving chorionic villi under the microscope; 2, fimbriated extremity; 3, ovary; B, fetus contained within its membranes, passed from the uterus on the day following the operation.



The idea that an "abdominal pregnancy" ever occurs primarily, as such, has been abandoned. It seems neither rational nor possible, when we consider the absorptive power of the peritoneum, that an ovum should drop into the peritoneal cavity, meet with a spermatozöon, and develop there. Knowing as we do how easily much larger and firmer masses are rapidly absorbed by the peritoneum, we do not believe that a young fertilized ovum would long escape destruction. We shall show later on how the condition called "abdominal pregnancy" originally started in the tube.

Three varieties of tubal gestation are recognized, according to the situation :

1. Tubal proper (free tubal) ;
2. Tubo-ovarian ;
3. Tubo-uterine or Interstitial.

The first variety, that situated in the free portion of the tube, between the cornu of the uterus and the fimbriated extremity, includes by far the largest number of cases, and consequently is of the greatest importance.

The tubo-ovarian variety we consider as still *sub judice*. As usually described, it includes the condition where the fimbriated extremity of the tube is adherent to the surface of the ovary, and the gestation takes place in the outer extremity of the tube, between it and the ovary. This variety is rare, and, as the treatment would be similar to that of the first variety, and the diagnosis would in all probability only be made at the operation or the autopsy, they will be considered together. We shall see later on that the direction of rupture may differ in the two cases.

Careful observation of specimens of ectopic gestation removed by operation has largely modified the views held concerning the tubo-ovarian variety. In all probability cases have been reported as tubo-ovarian in which the ovary, just as coils of intestine or the uterus, simply formed a part of the sac created by adhesive peritonitis binding together adjacent organs about the blood-effusion, resulting from rupture of any portion of the pregnant tube.

In the tubo-uterine or interstitial variety the gestation occurs in that portion of the tube which is embraced by the uterine wall. This constitutes a distinct class, and will be considered separately.

ETIOLOGY.—Concerning the etiology of ectopic gestation very little is known. The theory which has gained the widest acceptance is, that it is due to some lesion in the interior of the tube



obstructing the ovum in its passage to the uterus. This lesion is in some cases a desquamation of the epithelium, in a very few a stenosis of the lumen by the traction of peritonitic adhesions causing an angulated condition of the tube, and in others a change in the epithelium short of desquamation (a destruction of the cilia), but sufficient to cause a departure from its normal function. The theory of lesion in the interior of the tube seems to cover a large number of cases, and is strengthened by the fact that frequently a history of previous trouble on that side of the pelvis can be elicited, and the event is often, though not always, preceded by a period of sterility.

In some cases of ectopic gestation, on the other hand, the microscope has disclosed in the epithelium no deviation from the normal.

Recent investigations have shown that in certain cases of pregnancy decidual cells occur in the tubes as well as in the uterus. The view is therefore advanced that ectopic gestation is only possible in tubes containing decidual cells, and in such tubes anything delaying the progress of the ovum would favor the lodgement and ectopic development of that body.

This disaster may occur at any age: it may happen in a woman who has borne several children, or it may occur in the first pregnancy a few months after marriage.

As stated above, the event is often preceded by a long period of sterility, and yet it may follow a confinement by only a few months; in fact, it may accompany an intra-uterine pregnancy. In this case the presence of the intra-uterine gestation may perhaps be the cause of the extra-uterine.

**PATHOLOGY.**—We must consider—

1. Changes which occur in the tube;
2. Changes which occur in the ovum.

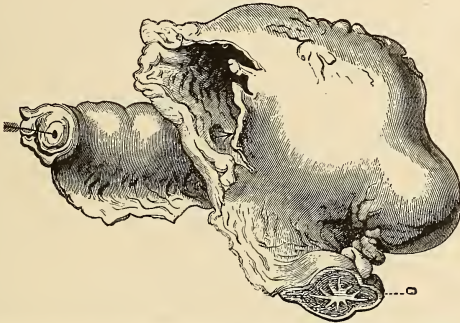
Following the lodgment of the ovum in the tube, the wall of the latter at first thickens; this is chiefly due to its increase in vascularity, especially at the site of attachment. As the ovum grows the tubal wall becomes thinned and weakened by the ingrowths of the chorionic villi. Simultaneously with the growth of the ovum, the fimbriated extremity of the tube becomes progressively narrowed, until at about the eighth week it is completely occluded. The method of this occlusion has been accurately described by Bland Sutton. As the structures of the tube become swollen from the congestion, the peritoneal and muscular coats of the fimbriated extremity form a prominent ring about the fimbriæ; this ring grad-

usually projects beyond the fimbriæ, then contracts and closes the ostium, leaving the fimbriæ within the tube concealed from view. Now, until this occlusion occurs, either one of two events is possible:

1. Rupture of the tubal wall;
2. Tubal abortion.

After the occlusion of the fimbriated extremity the ovum can escape from the tube only by rupture of its wall. As the chorion

FIG. 288.



Gravid Fallopian Tube at the Tenth Week, showing complete occlusion of the ostium: o, ovary with corpus luteum.

develops, the tubal wall, thinned by distension and weakened by the inroads of the villi, finally yields, the exciting cause coming either from without or from within the tube.

(a) From without: As a misstep, lifting, straining, or, not infrequently, from sexual intercourse, as was proven to be the case in the patient from whom the accompanying specimen (Plate XXX.) was taken, where the rupture immediately followed that event.

(b) From within: As a hemorrhage into the sac from separation of the tubo-chorionic vessels in the process of organic growth.

This rupture, when the gestation is situated in the tube proper, may take place in either of two directions:

1. Through a portion of the tube covered by peritoneum—viz. into the peritoneal cavity. (See Fig. 289.)
2. Through a portion of the tube not covered by peritoneum—viz. between the folds of the broad ligament—*i. e.* outside the peritoneal cavity. (See Fig. 290.)

In the tubo-ovarian variety the direction of rupture would be into the peritoneal cavity only.

When a rupture takes place into the peritoneal cavity, either one of two events may occur:

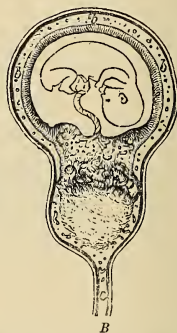
- (a) The hemorrhage may be sufficient to prove speedily fatal;
- (b) The hemorrhage may be insufficient to prove speedily fatal.

In the latter case the tubal laceration is small: the chorion in its

FIG. 289.



FIG. 290.



Diagrammatic Section of Fallopian Tube, representing the two directions of rupture in tubal pregnancy: A, into the peritoneal cavity; B, between the folds of the broad ligament; b, wall of Fallopian tube; c, cavity of broad ligament.

attempted escape plugs the opening and checks further hemorrhage; the effused blood then gravitates to the pouch of Douglas, finally coagulates, and is roofed in by peritonic adhesions. In this way a new false sac is formed. As the chorion grows this new sac is ruptured, with a second hemorrhage, which in turn may be fatal, or may again be arrested and the fatal event postponed. This process may be repeated several times, or, indeed, if the effused blood is small in amount and the rupture occurs early, the effused blood, fetus, and membranes may be absorbed and the patient recover.

The death of the fetus usually occurs with the first hemorrhage, but Webster reports and minutely describes a case in which the fetus escaped into the peritoneal cavity and went to term, the so-called placenta remaining in the tube. This may have occurred either by a marked distension and thinning of the tube, allowing the gradual escape of the fetus through the tubal wall, with little or

PLATE XXXIII.



Full-term Fetus developed between the Folds of the Right Broad Ligament: see torn in removal; partially sutured afterward: A, right tube opening out into broad ligament.



no hemorrhage, or the fetus may have gradually escaped through the fimbriated extremity—*i. e.* by tubal abortion.

When the rupture occurs through the floor of the tube, between the folds of the broad ligament, the death of the fetus also usually occurs at once.

Occasionally, however, the chorion only gradually changes its site of implantation, and the fetal circulation is maintained; fetal life continues, and may go to full term with complete development of the child.

Thanks to the frozen-section studies of Dr. Berry Hart, we now understand pretty clearly the changes which occur as the fetus develops. These changes were well exemplified in the case, the specimen of which is illustrated by the accompanying plate taken from a photograph. The folds of the broad ligament are opened out; the peritoneum is gradually lifted from the floor of the pelvis, from the lower portion of the rectum, and from the side, posterior surface, and fundus of the uterus. The uterus itself is enlarged, and usually pushed to the side opposite the gestation-sac.

The distance the peritoneum may be lifted from the pelvis and its contents without its rupture, by the gradual development of the fetus or by repeated hemorrhages beneath it, seems almost incredible to one who has not actually seen it either at operation or autopsy. This elevation not infrequently reaches to the level of the umbilicus or above, and explains how an incision may be made into the gestation-sac, to one side of the median line, without going into the peritoneal cavity. We say, "to one side of the median line," for although the peritoneum may be stripped from the side, posterior surface, and fundus of the uterus, it seems to remain attached to the anterior surface, especially at its lower portion, and an incision in the median line would usually go through the peritoneum.

The distension of the broad ligament and the elevation of the peritoneum is well shown in Fig. 291.

The amount of distension which the peritoneum forming the folds of the broad ligament will tolerate is sometimes exceeded, and a secondary rupture occurs into the peritoneal cavity, the primary rupture having taken place extraperitoneally—*viz.* from the tube down between the folds of the broad ligament; the secondary rupture from the broad ligament into the peritoneal cavity. Either one of two results may follow this event:

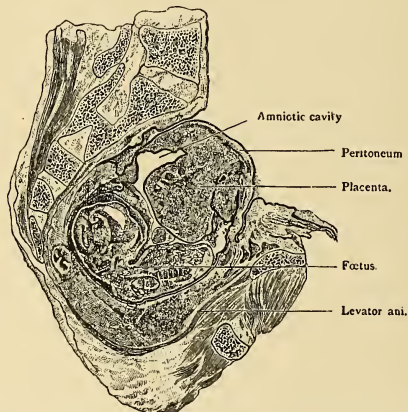


1. Profuse hemorrhage into the peritoneal cavity, with or without the escape of fetus or fetus and placenta ;

2. The gradual escape of the fetus into the peritoneal cavity, with little or no hemorrhage, the placenta retaining its attachment within the broad ligament and the fetus perhaps continuing its existence.

The first result, profuse hemorrhage, is more likely to occur when the distension of the broad ligament is due to recurring hem-

FIG. 291.



Transverse Section of the Pelvis of a Woman, with an Embryo and Placenta of the Fourth Month of Gestation occupying the Right Broad Ligament.

orrhages, and will be referred to again as one of the possible indications for operation in the treatment of an extraperitoneal rupture.

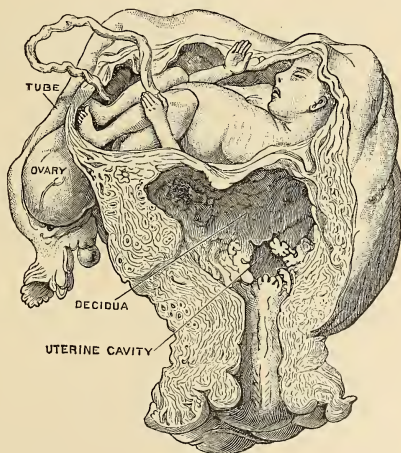
The second result, escape of the fetus with continuance of its life, is of great interest anatomically, as it explains the majority of the cases in which a fetus has been found free among the intestines, and has given rise to the erroneous impression of primary abdominal pregnancy.

We believe that by far the most usual place for the growth of an ectopic fetus escaped from the tube is between the folds of the broad ligament. Webster (*Tubo-peritoneal Ectopic Gestation*) has demonstrated the possibility of such a growth where the fetus gradually escaped from the tube directly into the peritoneal cavity and there

developed. This, however, must be only a very rare exception to the rule that *full-term ectopic fetuses are extra-peritoneal*.

*Tubal Abortion.*—By this term is meant an expulsion of the ovum from the fimbriated extremity of the tube at any time before its occlusion. As this occlusion usually takes place before eight weeks, tubal abortion is considered possible only during the first two months. This event is likely to occur only when the ovum is implanted in the outer third of the tube. Our knowledge of tubal abortion enables us to understand many cases of effusion of blood into the peritoneal cavity in which we find at operation or autopsy a tube empty, but with a collapsed appearance, as though it had been previously distended; and the true nature of the case is often placed beyond doubt by finding among the blood-clots either a

FIG. 292.



Tubo-uterine Pregnancy.

fetus, fetal membranes, or a firmly-clotted mass, in the interior of which microscopical examination discloses chorionic villi.

*Tubo-uterine or Interstitial Pregnancy.*—This variety of ectopic gestation includes those cases in which the impregnated ovum is lodged and develops in that portion of the tube which is embraced by the uterine wall.

In its life-history this condition differs from the other varieties of ectopic gestation in the following particulars:

- (a). Period of growth before rupture;
- (b). Direction of rupture.

Situated as it is within the substance of the uterine wall, rupture of the sac would not be expected to occur at as early a period as in the varieties called tubal proper and tubo-ovarian, and this is borne out in the histories of reported cases. The wall of the gestation-sac, instead of rapidly thinning, as occurs when the ovum is lodged elsewhere in the tube, markedly thickens, resembling the uterine wall in normal pregnancy, and rupture frequently does not occur until the end of the fourth month.

*Direction of Rupture.*—An interstitial pregnancy may rupture in either one of two directions: 1. Into the abdominal cavity. (See Fig. 293.) In this case the hemorrhage, without operative interference, is profuse and rapidly fatal on account of the thickness and vascularity of the wall.

FIG. 293.



Diagrammatic Representation of Interstitial Tubal Pregnancy at the Time of Rupture.

2. Into the cavity of the uterus. Such an event is considered possible, but, as it would be almost impossible to positively diagnose the condition from normal intra-uterine pregnancy, this direction of rupture we must regard as still *sub judice*.

Cases of interstitial pregnancy are, as a rule, only diagnosed during life at operation necessitated by an intra-peritoneal hemor-

PLATE XXXIV.



Tubal Abortion : membranes protruding from the fimbriated extremity of the Fallopian tube.



rhage, the pregnancy up to the time of rupture being considered normal.

*Period of Tubal Rupture.*—When the ectopic gestation is either of the tubal proper or tubo-ovarian variety, the rupture usually occurs some time between the third and the twelfth week, more often near the eighth. In the interstitial variety rupture may occur at any time between the third and the twentieth week, more often in the

FIG. 294.



Pregnant Fallopian Tube laid open, showing the fetus killed by hemorrhage into its membranes, but without the escape of the fetus from the tube.

fourth month. In tubal abortion, as previously stated, the ovum may escape from the tube at any time prior to the occlusion of the fimbriated extremity which occurs at the eighth week.

The isthmus of the tube, that straight narrow portion just outside the uterus, seems little adapted to distension with the growth of the ovum, and in our experience rupture of the gestation-sac has



occurred at an earlier period here than when situated in the ampulla of the tube. In a general way, then, we might say that an early escape from the tube is more likely to mean rupture of a sac situated in the isthmus, or a tubal abortion, than a rupture of the ampulla.

*Changes in the Ovum.*—Notwithstanding the implantation of the ovum upon foreign soil, the fetal portions of the placenta are developed much as they would be in the cavity of the uterus; it is only the maternal portion which is lacking, but this causes insecure attachment of the chorion, and, as the fetus develops, a rupture of some of the tubo-chorionic vessels easily occurs. This usually causes the death of the fetus, with or without its escape from the tube.

So long as fetal life continues the growth and development of the ovum seem fairly normal. When death of the fetus occurs early, however, with hemorrhage into its membranes, a condition is formed so resembling a uterine mole that it has been called "tubal mole" or "apoplectic ovum."

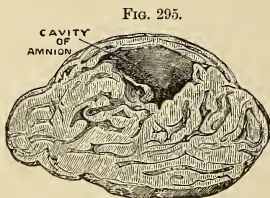
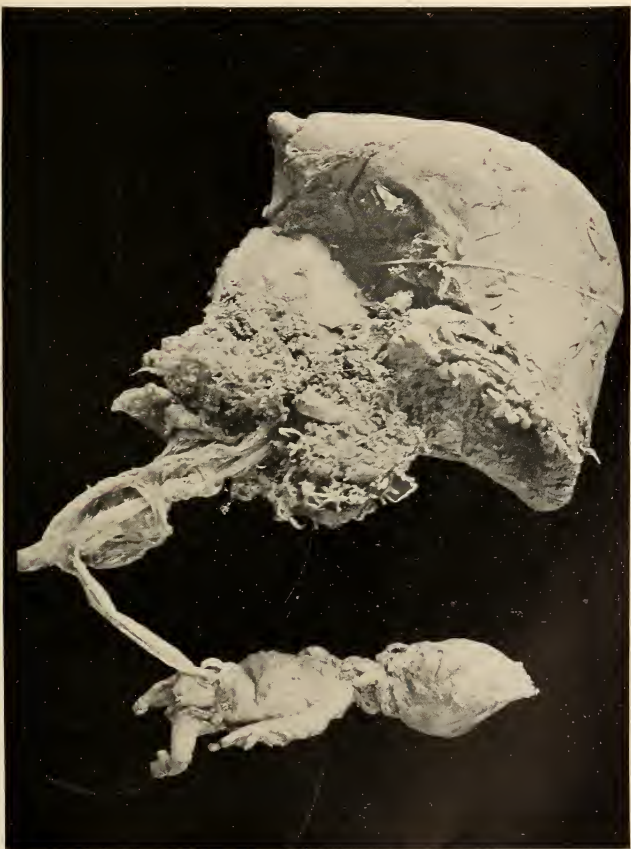


FIG. 295.

Apoplectic Ovum, or Tubal Mole (natural size).

The hemorrhage separates the ovum from the tubal wall, coagulates in the meshes of the chorion, causes contraction of the fetal sac by compression, and forms a mass resembling a dark-red blood-clot. This may be found in the tube, or, if the hemorrhage causes the death of the ovum at the same time it causes tubal rupture or abortion, the tubal mole may be found among a mass of blood-clots, either in the peritoneal cavity or between the folds of the broad ligament. This tubal mole may at first be mistaken for a simple blood-clot, but on section one can often find an amniotic cavity, as in Fig. 295, with or without a fetus; or, if neither amnion nor fetus is discernible, a microscopic section will usually disclose chorionic villi.

PLATE XXXV.



Tubal Abortion : placenta and fetus protruding from the fimbriated extremity of the Fallopian tube.



As previously stated, the death of the fetus usually occurs at the time of its expulsion from the tube. Rarely, however, fetal life continues, and may even reach full term. After its expulsion from the tube the following changes may take place in the ovum or fetus:

1. When the death of the ovum occurs early, forming a tubal mole, this may be absorbed by the tissues in which it is lodged, be it peritoneum or connective tissue. Rarely suppuration in it may occur, perhaps from the proximity of the rectum.

2. When death of the fetus occurs after it has reached a considerable degree of development and its bony framework is well formed, it may for a long time remain quiescent, the liquor amnii being gradually absorbed. Subsequently it may mummify from absorption of the fluids of the fetal tissues; it may calcify, forming a lithopedion, may be changed into adipocere, or the soft parts may suppurate and the fetal débris be discharged into the rectum, vagina, bladder, or through the abdominal wall.

**SYMPTOMS.**—The symptoms of a patient afflicted with ectopic gestation are of great importance, for by these symptoms, coupled with a careful study of the history of the patient, the diagnosis is usually made.

In almost every case there has been some departure from the normal menstruation. Usually the patient has gone over her monthly period for a longer or shorter time, it may be only a few days or may be several weeks. Occasionally, however, no period has been skipped, but there has been some change in the character of the last menstruation; usually a lessening in amount. Not infrequently, instead of the menstruation coming on in the usual way, there is at first only a splash, just enough to stain the clothes, then an irregular dribbling, followed by a more or less irregular, continuous brownish discharge containing débris. The early symptoms of pregnancy are often present, such as morning nausea, sensitive breasts, etc. The patient often believes herself pregnant, and this is of assistance in diagnosis.

The next symptom which may surprise the patient is a sudden attack of very severe, sharp pain on one side of the abdomen: this pain is usually excruciating, causing the patient to feel faint, grow pale, and perhaps lose consciousness; she is often covered with cold perspiration; she not infrequently vomits; the pulse becomes rapid and the temperature subnormal. Usually about this time metror-

rhagia appears, and may continue several weeks, being due to the separation of the uterine decidua. As shreds are usually passed from the uterus, the patient often believes she has had a miscarriage and that her troubles will soon be at an end. Following this attack of pain, symptoms of pelvic peritonitis often present themselves. They may subside and the patient be up and around, when she is suddenly seized with another attack of sharp pain, syncope, etc., perhaps even worse than the preceding.

Careful inquiry into the history of these cases often elicits the fact that the patients have been sterile for a longer or shorter period; to this, however, there are many exceptions. To recapitulate, we would call attention to the following symptoms:

- (a) Amenorrhea;
- (b) Symptoms of pregnancy;
- (c) Sudden sharp pain with syncope;
- (d) Metrorrhagia;
- (e) Often a history of previous sterility.

**PHYSICAL SIGNS.**—If examined prior to rupture, one simply feels a distended tube, perhaps a little more boggy and vascular than a hydro- or pyosalpinx of a corresponding size. There is the same elongated, sausage-shaped mass, extending from the cornu of the uterus laterally or downward and backward, which one feels in a salpingitis. The uterus is enlarged; the cervix is soft and patulous.

If seen at the time of, or soon after, a primary intra-peritoneal rupture, the physical signs are often very meagre. There is usually no distinct tumor, and one can only get the sensation of fluid blood or an indistinct doughy feel in the pelvis and the constitutional symptoms of internal hemorrhage.

When the rupture has occurred between the folds of the broad ligament, one gets all the physical signs of a pelvic hematoma.

Let us now digress a little and consider the conditions *pelvic hemocele* and *pelvic hematoma*. By pelvic hemocele we mean an effusion of blood into the peritoneal cavity. This would naturally gravitate into the pouch of Douglas should this not be obliterated, or, if profuse, the blood may rarely flow over into the utero-vesical pouch as well. Coagulation, although longer delayed than in blood effused into connective tissue, finally occurs, and the blood-mass is roofed in by peritonitic exudate binding together adjacent structures—coils of intestine, omentum, and uterus.

**ETIOLOGY.**—Concerning the etiology of pelvic hematocele our ideas have changed greatly within the past few years. While formerly the text-books contained long lists of causes of this condition, operative experience has taught us that in nearly all cases we can assign but one cause—viz. ectopic gestation; and, as the source of the blood, the tube, either from rupture or from tubal abortion. To this general rule we admit exceptions. We know that after the enucleation of diseased tubes and ovaries, or tumors of the same, an oozing surface is left which often gives rise to quite a large effusion of blood; here, however, the cause is plain, and would not produce confusion. We also admit the possibility, from a slight traumatism, of rupture of peritonitic adhesions, some of which are markedly vascular, and would cause a considerable blood-effusion. Other possible causes are rupture of an ovarian hematoma or excessive hemorrhage from the rupture of a Graafian follicle. These events, however, would only rarely occur, and may be considered as exceptions to the general rule stated above. Most of the cases of regurgitation of blood from the tube we believe to be instances of tubal abortion.

**Physical Signs.**—Previous to the encapsulation of the blood-effusion the physical signs are very few. There is a fulness in the pouch of Douglas which gives to the finger the impression of thick fluid, and from the floating up of the intestines there is usually more or less distension of the abdomen. When the effusion becomes encapsulated by peritonitic adhesions, the mass becomes firmer to the touch, the posterior fornix bulges, and the uterus is pushed forward. As the blood coagulates, the increase in the density of the effusion becomes apparent to the examining finger. The course and prognosis of pelvic hematocele are usually similar to ectopic gestation with intra-peritoneal rupture, and will be discussed later.

By *pelvic hematoma* we mean an effusion of blood into the connective tissue beneath the peritoneum—viz. between the folds of the broad ligament. Here, again, although other causes are probably more common than in a pelvic hematocele, a very common cause is the rupture of an ectopic gestation-sac. The reason for considering other causes more frequent than in hematocele lies in the fact that varix of the broad ligament, due to various causes of venous congestion, is common, and where such is present but a slight traumatism is required to produce a blood-effusion.

**Physical Signs.**—These differ from those of a pelvic hematocele.



While in the latter there is at first no limiting membrane, in the former the effusion is clearly limited by the folds of peritoneum forming the broad ligament, and a distinct tumor is developed. This tumor bulges down on one side of, and behind, the cervix, pushes the uterus forward and to the opposite side, and can be felt above Poupart's ligament when it has lifted the peritoneum from the pelvis. It seems to occupy all the space between the uterus and the sides of the pelvis, and if the finger is inserted into the rectum, the effusion, especially if situated on the left side, is found to have surrounded it, thus producing a stricture. This is due to the ring formed by the attachment of the peritoneum to the second portion of the rectum.

Concerning the changes in a pelvic hematoma, two are possible :

1. Absorption. This is possible even when the tumor is of quite a considerable size ;

2. Suppuration. This seems frequently due to the proximity of the rectum, or if the hematoma is due to a ruptured tube, infection may come from the uterus through the stump of the lacerated tube. The suppurating hematoma may rupture into the rectum, vagina, bladder, or rarely above the pelvic brim.

DIAGNOSIS OF ECTOPIC GESTATION.—For a clearer discussion, this may be divided into two periods :

1. Prior to tubal rupture or abortion ;

2. Subsequent to tubal rupture or abortion.

Few opportunities are presented for diagnosing ectopic gestation during the ante-rupture period. Unfortunately for the diagnosis, the patients during this period are apt to suffer but little. A large proportion of the cases have absolutely no symptoms leading them to suspect an abnormal condition. Occasionally, however, perhaps from surprise at the symptoms of pregnancy after a long period of sterility, or in their first pregnancy, in order to determine if that condition really exists, or from pain in one inguinal region, they present themselves to the physician, and under these circumstances the diagnosis has been made a number of times and its correctness verified by subsequent operation.

To enable one to make a diagnosis of ectopic gestation prior to rupture we would emphasize two rules, which we consider of great importance :

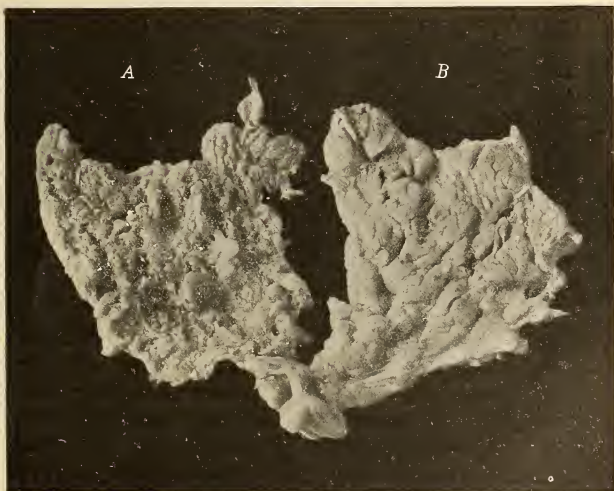
1. Whenever a pregnant woman presents herself with a mass at

the side of or behind the uterus, always think of the possibility of ectopic gestation.

2. Whenever any irregular symptoms of pregnancy occur the menstrual history should always carefully be inquired into, noting any change in its character, the exact duration in days, and its relative amount during each of the months which are open to suspicion.

The reason that so many more diagnoses of ectopic gestation are now made than formerly, and made correctly, lies in the fact that we are now on the watch for that condition. We need frequently to ask ourselves: Can this be ectopic gestation? This is especially

FIG. 296.



Decidua expelled from the Uterus in a case of Ectopic Gestation: *A*, rotated, so as to show the shaggy uterine side; *B* shows the free surface.

imperative when we meet with the early symptoms of pregnancy—nausea, sensitive breasts, softened cervix, etc., with a distended tube at the side of the uterus. This may be a hydro- or pyosalpinx simply coexisting with pregnancy. On the other hand, however, its boggy feel, a rather marked vascularity, and a careful observance of the second rule stated above concerning menstrual history may lead us to make a probable, if not a positive, diagnosis of ectopic gestation.

Another factor in the diagnosis of this condition is the expulsion of the uterine decidua. While the ovum is developing in the tube there is forming in the uterus a decidua resembling that of a normal pregnancy, but differing from it in having a smooth, inner surface,

FIG. 297.



Decidua in Situ. fibroid uterus removed at time of operation for ruptured ectopic gestation.

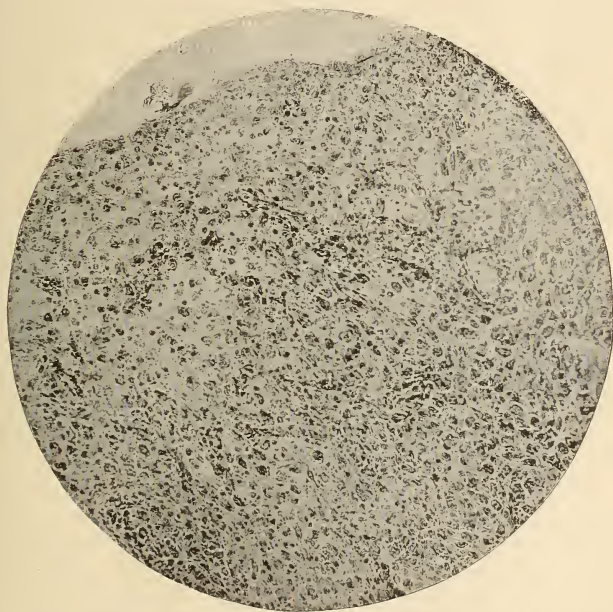
unbroken by the attachment of the ovum; in other words, having no decidua reflexa or serotina; it is all decidua vera. This decidua, usually at or near the time of tubal rupture or abortion, is discharged from the uterus, sometimes entire, sometimes in small particles or shreds. It is a membrane varying from an eighth to a quarter of an inch in thickness, shaggy on the surface which is attached to the uterine wall, smooth, but presenting numerous fine wrinkles, on the inner free surface. On microscopical section it presents the appearance shown in the accompanying cut (Fig. 298). When passed entire it forms a triangular sac containing three openings, one corresponding to each Fallopian tube and one to the internal os. With the separation and discharge of this decidua there occurs a metrorrhagia which may continue for several weeks. The passage of these shreds with the subsequent metrorrhagia is often a source of error both to the patient and her physician, and a miscarriage is frequently the source of an erroneous diagnosis.

There are two conditions from which the decidua from a case of ectopic gestation must be differentiated :

1. The decidua of an intra-uterine pregnancy ;
2. The membrane of a membranous dysmenorrhea.

The decidua in an early miscarriage may resemble in places that

FIG. 298.



Photomicrograph of a Section of Decidua in a Case of Ectopic Gestation, showing the large decidual cells.

of an ectopic gestation, but in the former there is found evidence of implantation of the chorion, villi, etc. which is wanting in the latter.

The condition called membranous dysmenorrhea is surrounded with much confusion. It is perfectly possible, in the light of recent experience, that some of the cases described as membranous dysmenorrhea were in reality cases of ectopic gestation. The points on which we would lay the greatest stress in differentiating the dys-

menorrhœa from the ectopic gestation would be the frequent recurrent character of the former at the time of a menstrual period and the absence of the symptoms of pregnancy. According to Wyder and Ayers, the dysmenorrhœal membrane does not contain the large cells seen in Fig. 298.

The diagnosis of ectopic gestation has occasionally been made by curetting a uterus for supposed retained secundines, under the impression that the patient had had a miscarriage, and finding the uterus empty save for the decidua, which showed no chorionic villi.

**DIAGNOSIS AT THE TIME OF, AND SUBSEQUENT TO, TUBAL RUPTURE OR ABORTION.**—This is usually not difficult if a careful history is obtained, and this is considered in conjunction with the present condition of the patient. If seen at the time of tubal rupture or abortion, we find, coupled with the history of the patient during the ante-rupture period, the symptoms of sudden shock and internal hemorrhage. The patient is suddenly seized with a sharp, excruciating pain, usually on one side of the abdomen. She feels faint, grows pale, perhaps loses consciousness; the surface of the body is often covered with cold perspiration; the pulse is rapid and feeble; the temperature is often subnormal. These symptoms, especially if there has been a period of amenorrhœa, should always suggest a ruptured ectopic gestation-sac. If the patient survives this primary rupture—and she frequently does—the symptoms abate, perhaps to be repeated at almost any instant, with or without a fatal result.

If seen subsequent to the time of tubal rupture or abortion, we have, in addition to the history of early pregnancy, with one or more attacks of sharp pain and threatened collapse, the physical signs of either a pelvic hemocele or a pelvic hematoma, depending on whether the rupture was intra- or extra-peritoneal.

**DIFFERENTIAL DIAGNOSIS.**—The condition most likely to be confused with an ectopic gestation is probably a tube distended with either serum or pus, especially the latter. The physical signs of the two conditions prior to rupture often closely resemble each other, and, just as the rupture of an ectopic gestation-sac is followed by symptoms of shock and then peritonitis, so may the rupture or leakage of a pus-tube be followed by similar symptoms. The chief point in their differentiation is the difference in their clinical history. Here comes in the necessity for eliciting, if present, the symptoms of a possible early pregnancy. During the ante-



rupture period, as already stated, the greater vascularity and boggy feel of a pregnant tube may enable one to differentiate it from a pyosalpinx.

Subsequent to the rupture the symptoms of the two conditions differ more widely:

<i>Ruptured Ectopic Gestation</i>	<i>vs.</i>	<i>Ruptured Pyosalpinx.</i>
Frequency of pulse greater.		Frequency of pulse less.
Temperature at first subnormal; later rises slightly.		Temperature rises steadily and markedly.
Pain of shorter duration.		Pain of longer duration.
Patient shows loss of blood.		Patient does not show loss of blood.
Septic symptoms not usually present.		Patient soon shows signs of sepsis.

A fibro-myoma is sometimes confused with an ectopic gestation, and instances occur where the differential diagnosis is difficult. The means on which we rely are chiefly the difference in the history of the two cases: In the case of ectopic gestation the short history, first of amenorrhea, then attacks of sudden sharp pain, faintness, and metrorrhagia; in the case of the fibro-myoma a long history of gradually increased menstruation, and perhaps gradually increased pressure-symptoms, without the symptoms of early pregnancy.

In physical signs the fibro-myoma is usually much more intimately connected with the uterus and harder than the ectopic gestation. Both conditions may coexist, as in the case from which the specimen (Fig. 297) was taken.

Into the differentiation between pelvic hematocele and pelvic hematoma due to ectopic gestation and those due to other causes, we shall not enter, believing our present knowledge insufficient for the task, and that most cases of pelvic hematocele and hematoma, especially the former, are due to the rupture of an ectopic gestation-sac. We believe, however, that in the present state of our knowledge we should not declare to be due to an ectopic gestation an effusion of blood in the pelvis found at operation or autopsy, unless we find either a fetus or chorionic villi, or unless we have obtained from the uterus a decidua devoid of chorionic villi.

The appearance of the chorionic villi, as seen in section under the high powers of a microscope, is well shown in Fig. 299. The central portion of the villus is seen to be composed of irregular-shaped cells, while the outer wall consists of a single or double row of cubical epithelium. Sometimes several villi may be seen in a single field, but not infrequently a large number of sections have to be cut and examined before a single villus can be found.



The differences in the physical signs of pelvic hemocele and pelvic hematoma have already been given, and we will here only refer to them.

Tumors of the ovary are sometimes confused with ectopic gestation, but a careful study of the menstrual history and a search for

FIG. 299.



Photomicrograph of Chorionic Villi, found in the tube of a case of ectopic gestation.

the physical signs of pregnancy will usually enable one to arrive at a correct diagnosis. Mistakes, however, in diagnosing ectopic gestation are bound to occur, even with the most careful, from the fact that the condition is sometimes found at operation, when not a period has been missed and not a symptom of pregnancy has been presented.

**TREATMENT.**—In considering this division of our subject we would recognize two periods, requiring separate discussion :

1. Prior to tubal rupture or abortion ;
2. Subsequent to rupture :
  - (a) Intraperitoneal.
  - (b) Extraperitoneal.

When the diagnosis of an ectopic gestation is made prior to the rupture of the tube, the question which must present itself to every conscientious gynecologist is : How can we best subserve the interests of our patient? The advocates of electricity claim that by the current, either galvanic or faradic, the fetus is killed and the products of conception are absorbed. Admitting this as a possibility, we still believe that we are not consulting the best interests of our patient by so doing.

In spite of the unfortunate case of Matthews Duncan, referred to in nearly every work on this subject, in which high currents, both galvanic and faradic, were used without killing the fetus, we believe that in many cases, when seen early, electricity will kill the fetus, but that the danger to the patient disappears with the life of the fetus we cannot believe. Even after the death of the fetus, hemorrhage into the tube sufficient to cause its rupture or tubal abortion, although it may not occur in every case, is still far from improbable.

Further than this, while waiting for a cure by electricity or in the manipulation incident to its application, tubal rupture or abortion, with fatal hemorrhage, may occur before the surgeon has time to open the abdomen and remove the sac. A forcible illustration of this was the case illustrated by Fig. 300. The patient was moved from the bed to the table for the application of electricity. In so doing the tube ruptured, and before the surgeon could be obtained and the abdomen opened the patient was moribund from internal hemorrhage.

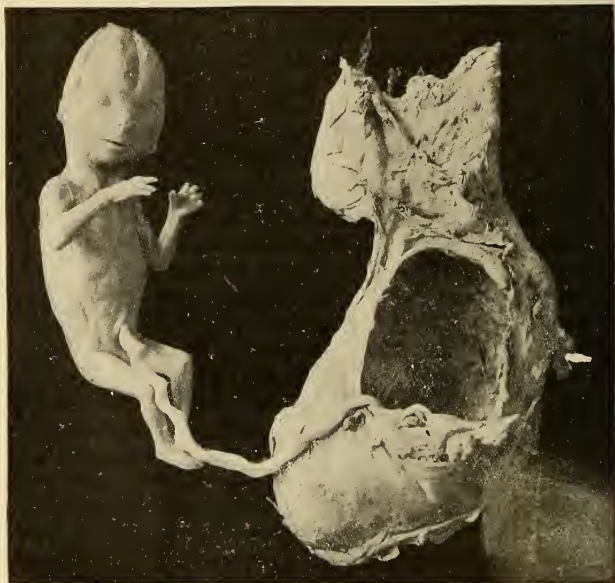
Even if the fetus and membranes are absorbed under the use of electricity, a damaged tube is left, which is very likely to prove a source of future trouble.

For these reasons we claim that electricity is not a satisfactory method of treating this condition. Galvano-puncture of the sac is dangerous, and ought never to be used. We believe that the method which gives the best promise of deliverance, not only from present danger, but from future trouble, is removal of the pregnant tube.

We admit the possibility of a tubal rupture or abortion with only

a slight hemorrhage, the absorption of the effusion, and the recovery of the patient. This is a possibility, but no one can tell when this is to be the result, or when a rupture is to occur with hemorrhage so profuse as to be fatal within a few hours without operative interfer-

FIG. 300.



Tubal Rupture in Case of Ectopic Gestation.

ence. From the time an impregnation occurs in a Fallopian tube until the tube is removed, that patient is never free from danger.

Moreover, during the period prior to the rupture of the tube the operation for the removal of the gestation-sac is one of the simplest in abdominal surgery, and in the hands of a skilled operator should have a mortality nearly *nil*.

Let us next consider the treatment at the time of, and subsequent to, tubal rupture or abortion. Here, again, we must consider two classes of cases depending on whether the rupture is *intraperitoneal* or *extraperitoneal*. If *intraperitoneal* rupture has occurred, most

electro-therapeutists agree that the time for their method of treatment has passed, and it is the consensus of opinion that there is now but one proper treatment—viz. celiotomy and removal of the lacerated tubal sac. We do not mean to say that every case is fatal at its first hemorrhage. Many cases prove the contrary, and in the hands of careful observers it may be good practice, *if the patient is improving in pulse*, to wait till she has rallied from the shock of the initial hemorrhage before operating. The safest rule, however, is to *prepare at once* for operation.

Just a word as to the method of procedure. Strict asepsis is a matter of great importance. The gestation-products and the effused blood at the time of or soon after rupture may be considered aseptic; at the same time they form a medium very easy to infect.

On making the incision in the median line down to the peritoneum the latter is often found tense and dark; and at the first nick of the peritoneum fluid blood may well up in great abundance. No attention must now be paid to the blood already in the peritoneal cavity, but the source of the hemorrhage, the lacerated tubal sac, is to be seized at once, ligated, and removed. Not infrequently it may be advisable to remove the opposite appendage and the uterus at the same time. The manipulations necessary for the removal are the same as those described in the article on Pelvic Inflammation. The same structures are dealt with, and, as a rule, the tubal pregnancy is complicated by adhesions, just as is the case in pus-tubes. We now have time to remove the blood-clots and products of conception, which are probably free in the abdominal cavity. Large clots and masses are removed by the hand; the remainder may either be floated out with the irrigating fluid, boiled water (preferably containing a half-teaspoonful of common salt to the pint), or, what is often sufficient, the blood may simply be removed by sponging. Too much time must not be spent in attempting to remove every blood-clot. Let the pelvis be sponged and the abdomen closed. Unless infection has occurred or oozing from vascular adhesions is pronounced, drainage is unnecessary.

If the patient has lost a large amount of blood and the pulse is very feeble, some of the irrigating saline fluid may with advantage be left in the abdomen; also a saline enema containing stimulants may be administered. The question of infusion may have to be decided.

*Extra-peritoneal Rupture.*—If this event has occurred, as deter-

mined by the physical signs given under Pelvic Hematoma—viz. the circumscribed tumor, the lateral fixed position, stricture of the rectum, etc.—the treatment is usually *non-operative*. The patient should be kept quiet in bed and cold in the form of ice-bags applied to the abdomen, while the progress of the case is carefully watched.

In the majority of cases the pelvic hematoma thus formed will gradually be absorbed. There are, however, three possible indications for a future operation :

1. If the hematoma suppurates ;
2. If repeated hemorrhages occur into the sac ;
3. If fetal life continues.

Occasionally, through infection from the rectum or from the uterus through the stump of the lacerated tube, suppuration of the hematoma occurs : it is then to be incised through the vagina, washed out, and thoroughly drained. If repeated hemorrhages are added to this hematoma, two courses are open, according to the size of the tumor. If comparatively small and situated low in the pelvis, it may be incised through the vagina, the clots and débris removed, and the cavity drained. If large and extending high in the pelvis, coeliotomy is probably the better operation. The broad ligament is incised and the blood-clots and products of conception are removed. If the contents of the sac appear aseptic, the sac may be sponged out and then closed.

If for any reason the contents of the sac seem open to the suspicion of sepsis, the sac had better be stitched to the lower portion of the abdominal wound and drained. A vaginal opening into the sac, where practicable, will favor drainage and shorten convalescence.

*Fetal Life Continuing.*—In the rare condition where fetal life survives the tubal rupture new problems present themselves. We have seen above that in almost all cases this only happens when the rupture is extra-peritoneal, between the folds of the broad ligament. From the time of tubal rupture until the ectopic fetus has reached the period of viability it is to be regarded as a foreign body endangering the life of the mother, and the indication for its removal is emphatic. After the fetus has reached a viable age its life has some claims upon the surgeon, but from the fact that ectopic fetuses, even if allowed to reach full term, are usually frail and few reach adult life, as well as for other obvious reasons, it must be borne in mind that the claims of the fetus are always secondary to those of the mother. After the seventh month, if the circumstances are such



that the mother can be carefully watched by one competent and prepared to operate promptly in case untoward symptoms present themselves, it may be justifiable to wait a few weeks and allow the fetus this additional time for growth and development. Each case, however, must be judged by itself. To wait until pseudo-labor has passed and the child is dead is neither scientific nor surgical.

Having prepared for operation, an incision is made well to one side of the median line, so as carefully to avoid opening the peritoneal cavity; the fetal sac is incised and the fetus is extracted. The chief point at issue in the whole treatment of a living ectopic fetus now presents itself: How shall we deal with the placenta? Whenever it is possible to ligate in advance the vessels supplying the fetal sac and the patient is in good condition, the best procedure is the complete removal of the sac and placenta even if the uterus has to be removed at the same time. When, however, the placenta lies in intimate vascular connection with all the important structures at the bottom of the pelvis, most operators are agreed that the safer method is to stitch the fetal sac into the abdominal incision, pack the sac with gauze, and wait until the placenta separates. The sac is then kept open and as clean as possible until it closes from the bottom. When the operation discloses the fact that the fetus has been dead for some time, the placenta is, as a rule, only loosely attached, and can be separated with very little danger of hemorrhage. In such cases the placenta is removed and oozing is controlled by gauze packing.

There is one other condition the treatment of which requires consideration—viz. interstitial pregnancy with intraperitoneal rupture. Although rare, this condition needs prompt surgical interference if the patient is to be saved. The treatment is abdominal hysterectomy.

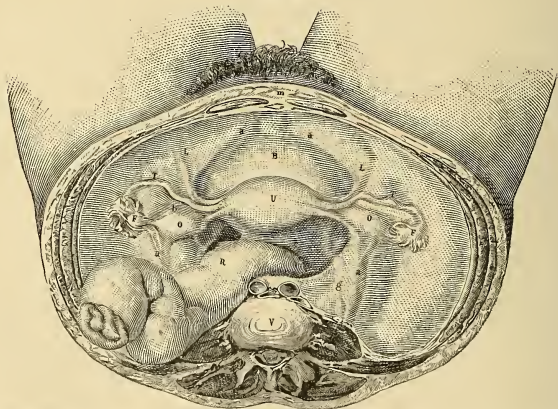


## DISEASES OF THE OVARIES, INCLUDING TUBAL ANOMALIES AND BROAD-LIGAMENT CYSTS.

### ANATOMY AND PHYSIOLOGY OF THE OVARY.

THE ovaries in the human female are situated, one on each side of the uterus at the level of the brim of the true pelvis, in the posterior fold or leaflet of the broad ligament. The other two leaflets

FIG. 301.



Horizontal Section of the Abdomen immediately above the Crests of the Ilii: *B*, fundus of bladder; *U*, uterine body; *O*, ovary; *L*, round ligament; *T*, Fallopian tube; *V*, sacrum; *R*, rectum; *C*, utero-sacral ligaments; *g*, ureter.

of the ligament are formed superiorly by the Fallopian tube and anteriorly by the round ligament. When the woman is in the erect position and the uterus in its normal situation, the ovary lies upon the ligament and looks upward and backward. The ovary is about an inch and a quarter long, three-quarters of an inch in width, and half an inch thick, convex upon the posterior and flattened upon the anterior surface, resembling in shape and size an almond; the external extremity is blunt and rounded, the internal pointed, pro-

jecting toward the ovarian ligament. It is connected with the uterus by the latter ligament, which is about one inch long.

The normal ovary weighs from ninety to one hundred and thirty-five grains. It is but partially covered by peritoneum, as is demonstrated by the contrast between the columnar epithelium of its posterior surface and the pavement epithelium of the peritoneum. The ovary consists of an external cortical portion, composed of cellular elements, and an internal medullary or fibrous portion, through which the blood-vessels, lymphatics, and nerves are distributed. The blood-vessels and nerves enter through the lower portion, which is called the hilum.

At the fourth month of intra-uterine life the germinal epithelium and the stroma undergo a process of adhesion, by which masses of epithelium are aggregated in the stroma, forming tubes. Some of these tubes possess outlets to the surface of the organ. Some cells in the tubes early attain to considerable size, have a nucleus, and form the ova. The ova become isolated, and by further proliferation of cells acquire a receptacle—the Graafian follicle. The germinal epithelium is divided by vascular stroma into two layers—an outer, composed of thin columnar cells, with one or two rows of round cells, which contain primitive ova, and an inner, thicker stroma between two layers of cells, which subsequently forms the tunica albuginea.

The ovum originally consists of a nucleus and nucleolus, with a small amount of protoplasm. It is never situated in the centre of the follicle, but occupies the side most distant from the surface of the ovary. The number of ova in an ovary have been estimated as numbering from 36,000 to 400,000. It is evident that Nature has made provision for the loss of a large number in a rudimentary form.

The formation of ova and egg-balls terminates with fetal life, but the isolation of the ova and transformation of egg-balls into follicles may be continued a couple of years later.

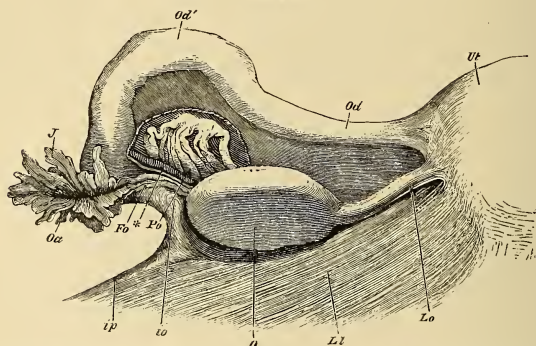
The blood-vessels of the ovary are derived from the ovarian artery, analogous to the spermatic in the male, which comes off from the aorta. It anastomoses with the uterine, a branch of the internal iliac artery.

The right ovarian vein enters the inferior vena cava at an acute angle and is supplied with a valve. The left enters the left renal vein at an angle and is without a valve. To this anatomical fact is

attributed the greater relative frequency of disease of the left ovary. The nerves enter the hilum as two fine twigs from the ovarian plexus.

*Puberty.*—At birth the ovary is flattened and elongated. As puberty approaches it assumes an olive shape, which indicates the sexually mature female. This period is characterized by the advent of the intermittent discharge known as menstruation, supposed to be synchronous with ovulation. That these processes are not neces-

FIG. 302.



U, uterus; O, ovary; Oa, infundibulum and abdominal aperture of the Fallopian tube and fimbriae; Fb, fimbria attached to the ovary; Po, parovarium; ip, marginal fold of broad ligament continued on to the infundibulum (infundibular ovarian ligament); ip, the same fold connecting the former with the pelvis; Od, isthmus of the Fallopian tube; Od', ampulla; \*, fimbrio-ovarian groove, lined by mucous membrane covered by ciliated epithelium; L, muscular striae under posterior layer of broad ligament; Lo, muscular utero-ovarian ligament.

sarily interdependent is evident from the fact that women become pregnant before the first occurrence of the menses, and, indeed, some have given birth to several children without ever having menstruated. Numerous cases are upon record where women have become pregnant after the occurrence of the menopause.

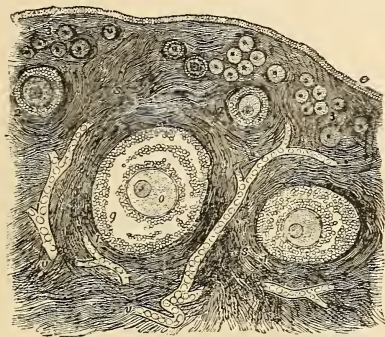
Puberty generally takes place between the thirteenth and fifteenth years. A well-established corpus luteum has been found in the ovary of a child which died at nine years.

While it is indisputable that ovulation may occur without menstruation, it is to be doubted, notwithstanding the views of Tait, whether menstruation ever takes place in the absence of both of the ovaries. The cases in which menstruation has continued after the ovaries were removed are those in which a portion of the ovarian

stroma was overlooked where it extended downward upon the ovarian ligament, or accessory ovaries were present, or there were tufts of ovarian stroma spread over the adjacent pelvic peritoneum.

The mature human ovum measures  $\frac{1}{120}$  of an inch in diameter. It is provided with a germinal vesicle which has a diameter of  $\frac{1}{300}$

FIG. 303.



Section of Ovary.

of an inch, and within it a germinal spot whose diameter is  $\frac{1}{3000}$  of an inch. As the ovum matures it moves from the centre to the periphery of the follicle; induced by the secretion of liquor folliculi contained in its discus proligerus, it is impelled against the thinned wall. This wall consists of two layers—an outer, the stroma of the

FIG. 304.



Typical Corpus Luteum, fifteenth day from the beginning of menstruation.

FIG. 305.



Freshly ruptured Follicle, twenty days after the beginning of the last menstruation.

ovary, and an inner, the follicular epithelium. The ovisac is most vascular at the point of rupture, and as the ovum escapes into the peritoneum or oviduct the ruptured vessels bleed and fill up the space with a clot. This clot, as it contracts, becomes known as the corpus luteum. If fecundation of the ovum has occurred, the act

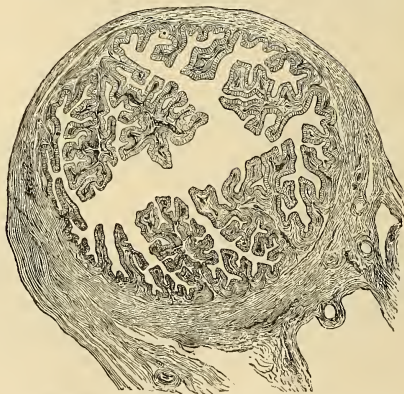


of conception leads to greater vascularity and the formation of a large clot, designated the true corpus luteum to distinguish it from the false or small, less durable formation of ordinary unfecundated ovulation.

The true corpus luteum is largest about the eleventh week, and continues to the end of pregnancy. The false rapidly becomes smaller and presents a bright and shining centre. The successive rupture of matured follicles leaves cicatrices upon the surface of the ovary.

*Fallopian Tube.*—Projecting from each side of the fundus of the uterus, just posterior to the round ligament, and occupying the superior fold of the broad ligament, is the Fallopian tube. Its average length is about four inches, and its greatest width is at the outer extremity, called the fimbriated extremity, infundibulum, or morsus diaboli. Its orifice is called the ostium abdominale, and is surrounded by four or five large and eight or ten small fimbriæ, which are continuous with the mucous lining of the tube, and one of which, the fimbria ovarica, extends to the ovary. The narrow-

FIG. 306.

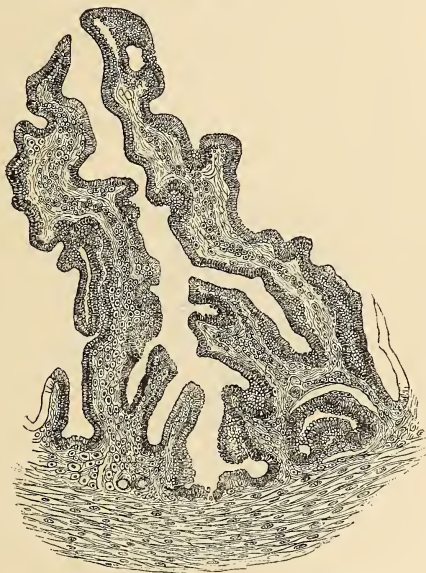


Transverse Section of the Fallopian Tube of a Macaque Monkey.

est portion of the tube is the inner or uterine end, an inch long, which is known as the isthmus. Its orifice is called the ostium internum. The diameter of the isthmus varies from one-twelfth to one-sixth of an inch, while the diameter of the ampulla, or outer

portion of the tube near the ostium, is from one-fourth to one-third of an inch. At its origin the tube is directed upward and backward; the ampulla curves upon itself until the infundibulum or fimbriated extremity is directed toward the ovary. The fimbria ovarica has upon its upper surface a groove bordered by small fringes or fimbriæ. Along this furrow passes the ovum to the oviduct as it

FIG. 307.



Recess of the Tubal Mucous Membrane of the Panolian Deer.

escapes from the ovary, doubtless facilitated by the current produced by the wave-like motion of the cilia.

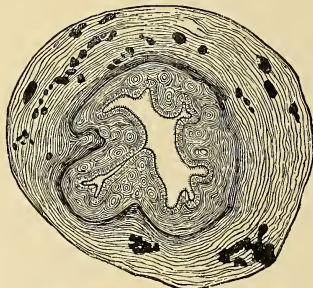
The Fallopian tube has three coats or layers—the peritoneum, which does not completely encircle it, forms the mesosalpinx; the muscular consists of longitudinal and circular fibres; the internal coat consists of the mucous membrane. The latter contains no glands, and is thrown into longitudinal furrows and projections. Comparison of Figs. 306, 307, and 308 shows that the arrangement of the folds of the tube in the lower animals is much more complex than it is in the



human female. These folds possess the characteristics of glandular structure. The membrane is lined with ciliated columnar epithelium. "The function of the latter," says Tait, "is to expedite the passage of the ovum to the womb, and to limit the opportunity for entrance of the spermatozoa." This theory obligates conception, as a rule, to occur in the uterus, but the repeated occurrence of ectopic gestation, in cases in which careful examination has failed to disclose any abnormal condition of the membrane between the gestation-sac and the uterus, goes far to discredit the theory.

The most important change taking place at puberty is in the structure of the tube. It becomes more vascular, its muscular structure is developed, and the epithelial layer is fully formed. These changes result in the functional movement through which

FIG. 308.



Transverse Section of the human Fallopian Tube.

pregnancy is rendered possible. As has already been noted, ovulation has repeatedly occurred prior to puberty, but the ovum has been lost in the peritoneal cavity. Ovulation may continue after the menopause, though the ovaries have become atrophied, but the tubes will then have become straightened, and again fail to carry the ovum to the uterine cavity.

The ovary and tube are situated in the folds of the broad ligament, the superior fold being occupied by the latter. The ligament is continued to the ileo-pectineal line by the infundibulo-pelvic ligament. Between the tube and ovary, and within the fold of the broad ligament, is an embryonal body, which consists of a number of small tubes and cysts, and is known as the parovarium or organ of Rosenmüller. It is most probably the remains of the Wolffian

body. The tubes of which this body is composed sometimes extend into the hilum of the ovary, and thus afford, according to some authorities, a congenital source of origin for some forms of ovarian cyst. A small, thin-walled cyst, known as the cyst or hydatid of Morgagni, hangs from the posterior surface of the Fallopian tube by a long pedicle. It has no pathological significance.

#### MALFORMATIONS OF THE OVARY AND TUBE.

Congenital absence of both ovaries occurs but rarely. When this malformation occurs, it is generally associated with defective development of the uterus. In such patients the physical changes in conformation incident to puberty do not occur, and the individual more closely resembles in appearance the male. When one ovary is absent, there is likely to be a deficiency in the development in the corresponding half of the uterus and tube. In a number of cases there has also been an absence of the corresponding kidney. A third or accessory ovary is very infrequent.

Doran asserts that small fibro-myomata in the ovarian ligament have been mistaken for supernumerary ovaries. Small islets of ovarian tissue have been found upon the peritoneum. Such a condition or the incomplete removal of an ovary undoubtedly has been the cause of menstruation subsequent to oöphorectomy.

Where the ovaries are absent or marked failure in their development has occurred, the sexual functions are never performed normally. The absence of one ovary or its serious involvement by disease constitutes no obstacle to either sexual intercourse or conception. It is very important to determine, if possible, that the ovaries are absent or rudimentary, as when these conditions are once recognized the absolute futility of any measures to establish menstruation is demonstrated.

MALFORMATIONS OF THE TUBES consist chiefly in defective development of the fimbriæ at their abdominal ends. The tube may be unusually short or have supernumerary ostea or openings. These openings may be provided with fimbriæ or the latter may be absent. An unusually convoluted tube is sometimes observed, evidently due to its defective development, resembling the condition seen in women prior to puberty. At times the convolutions of the tube form actual strictures, which contract its cavity sufficiently to render the woman sterile.

## DISPLACEMENTS OF THE OVARY AND TUBE.

Hernia through the inguinal canal is a rare condition. It is generally found upon the left side. Hernia of the ovary may occur without the presence of any other organ in the hernial sac, unless it be the Fallopian tube. The presence of the ovary is generally secondary, however, and results from adhesions to the omentum and the intestines.

Most probably the first surgical removal of the ovaries was performed by Potts for ovarian hernia. The displaced organs may readily be mistaken for glands or labial tumors. The constant presence of a tumor, its physiological character, the dull, sickening pain, and extreme nausea, should aid in the diagnosis. The ovary has also been known to make its exit through the crural canal, the greater sacro-sciatic foramen, and the umbilicus. Such displaced organs may become cystic. Chenieux has reported a cyst of this variety in the right buttock which was mistaken for a lipoma.

**TREATMENT.**—Taxis should be judiciously and carefully exercised, the ice-bag or the sand-bag may be applied, and after reduction has been effected a truss should be worn. If the symptoms are annoying and reduction cannot be accomplished, the sac should be incised and the ovary replaced or removed, according to its condition.

*Prolapsus Ovarii.*—Displacement of the ovary may be dependent upon, or independent of, the position of the uterus. When the latter organ is retroverted or -flexed, the ovary is no longer supported upon the broad ligament, but hangs from it. The ovary may rest in front of the uterus, but it generally lies beneath that organ in the cul-de-sac. The ovary may be displaced, while the uterus retains its normal position. The left ovary is most frequently displaced.

The prolapsed organ is exceedingly tender, and is the cause of dysuria, dysmenorrhea, and pain during coition and defecation. The pain during and following the marital act may be so great as to preclude its performance. The paroxysms may continue for more than an hour subsequent to defecation.

**ETIOLOGY.**—Prolapsus is generally a sequel of gestation; the broad ligament becomes extended and the infundibulo-pelvic ligament may give way. Enlargement of the ovary from chronic inflammation or perimetritis may be important factors.

**DIAGNOSIS.**—By vaginal and rectal palpation a mass is deter-

mined which when movable can be displaced upward, or whose pedicle can be recognized when the tumor is pressed downward. It is exceedingly sensitive, and pressure upon it causes a peculiar sickening sensation, similar to that produced by pressing an inflamed testicle.

In displacements complicated by severe inflammation the ovaries and tubes may be fixed behind the uterus.

TREATMENT.—The first consideration should be rest. The bowels must be carefully regulated and the marital relation be absolutely prohibited. The patient may be placed in the genu-pectoral position and the organs pushed up and maintained by a suitable pessary. The reinforced pessaries prove the most satisfactory, as their thickened posterior bar affords more efficient support and decreases the possibility of the organ being pinched between the pessary and the sacrum. The occurrence of this accident is attended with agonizing pain, rendering the patient unable to move until the pressure is removed. When various pessaries have been unsuccessfully tried, and the patient is incapacitated for her duties, abdominal section should be performed, and ovarian fixation effected, either by restoring the infundibulo-pelvic ligament or suturing the pedicle of the ovary to that part of the anterior parietes corresponding to the exit of the round ligament. This operation may be associated with ventro-fixation of the uterus, when retroversion of that organ complicates the displacement. Descent of the ovary alone never justifies extirpation. The latter procedure should only be considered when the displacement is associated with marked oöphoritis or perioöphoritis.

#### CONGESTION OF THE OVARIES.

The ovaries are physiologically congested in ovulation and during coition. This congestion in excess or prolonged becomes pathological. An over-congestion of the ovaries is not infrequent at the establishment of the menstrual function, especially in individuals in whom the mental faculties have been developed at the expense of the physical structure. Girls are often too closely confined to school and to the study and practice of music when Nature requires her forces in order to secure perfect development. Blood may extravasate into the follicles and stroma of the ovary, more frequently into the former. The hemorrhage into the follicles may distend the ovary to the size of a hen's egg or even to that of an orange. Later, this is converted into a pigment the consistency of honey, having a

rusty chocolate color. Winckel has reported similar conditions associated with heart disease, typhoid fever, phosphorus-poisoning, and in extensive burns. The follicle generally does not rupture, but the ovarian tissue is completely destroyed. A case came under the observation of the author in which each ovary was distended to the size of a small orange, and consisted of thin-walled cysts filled with dark grumous blood. Follicular apoplexy, as well as ovarian congestion, generally occurs in the sexually immature. It may terminate in absorption, or the ovary may rupture and a large hemorrhage take place into the peritoneal cavity, causing fatal peritonitis.

The principal symptom of congestion of the ovary is pain in the lateral regions of the pelvis for a week or ten days prior to the appearance of the flow, which becomes less or disappears with its cessation. The escape of blood relieves the engorged organs, and the only period of comfort is experienced during menstruation. The flow is prolonged and excessive, frequently amounting to a hemorrhage. The patient becomes weak, pale, and anemic.

**DIAGNOSIS.**—The existence of this condition should be suspected from the age, near puberty, the excessive and prolonged flow, anemic appearance, weakness, pain, and tenderness within the pelvis—which is generally more marked upon the left side—and not infrequently pain in the corresponding mammary gland. Follicular apoplexy is rarely recognized, as it presents no distinctive symptoms.

**TERMINATION.**—Ovarian congestion under proper hygiene and treatment may disappear. Where it continues it is transformed into chronic inflammation. The collections of blood in follicular hemorrhage may be absorbed, leaving an enlarged cicatrix, or they may break down and destroy the ovarian structure, forming an ovarian hematoma. Extensive hemorrhage with rupture of the ovary may cause pelvic hematocele, or even death.

**TREATMENT.**—Attendance upon school, and particularly the study of music, should be discontinued; the reading of emotional literature interdicted; and out-door pursuits encouraged, such as horseback and bicycle riding and walking. City girls should be sent to the country or sea-shore. Regular action of the bowels should be secured, and a generous diet afforded, from which sweets and pastry must be largely excluded. A morning sponge-bath, followed by friction with a coarse towel, will be serviceable. Rest in



bed for a few days prior to and during the entire menstrual period should be the rule. If the flow is excessive, the period should be preceded for a few days by the administration of one of the following remedies : fluid extract of ergot 3ss, ergotine gr. ij in capsule, or a capsule or tablet triturate of hydrastinin, gr.  $\frac{1}{8}$  to  $\frac{1}{4}$ , three times daily. During the menstrual intervals potassium bromide, gr. xv, or potassium chlorate, gr. v, administered three times daily, with such tonics as quinine, strychnine, and the bitter tinctures should be given.

The anemia may tempt one to resort to the use of the salts of iron, but experience teaches that this remedy is of service only after the tendency to hemorrhage has ceased. Its earlier administration but aggravates the tendency to bleeding.

#### OÖPHORITIS AND PERIOÖPHORITIS.

Inflammation of the ovary may be acute or chronic. Anatomical distinctions of parenchymatous, follicular, and interstitial are made, but such distinctions are rarely determined clinically.

#### ACUTE OÖPHORITIS.

In acute inflammation the ovary becomes enlarged, filled with cysts, or is œdematous; the cysts are filled with a cloudy serum looking like pus. The ovary may in a few days become three or four times its normal size. The cut surface will exude a large quantity of serous fluid, while in more severe grades a number of purulent yellow streaks will be seen starting from the hilum. A smeary mass will be discharged in some cases, while in others there will be the distinct pus-collection of an abscess. The organ may attain to the size of a man's head, though generally it is not larger than a hen's egg, when it produces the sensation to the examining finger of a firm mass. An inflammation of the ovary may progress to the formation of abscess, and subsequently the watery contents be absorbed, leaving a cheesy mass. In the milder forms of inflammation resolution may take place. The connective tissue undergoes retraction, depressing the surface here and there, producing premature involution or cirrhosis of the ovary. The ovary may be reduced to the size of a hazelnut. This form of inflammation is prone to affect both ovaries, while the abscess is usually found in but one. In perioöphoritis the capsule of the ovary becomes thickened; the entire organ is



bound down by perimetric bands of adhesions. The thickening of the capsule renders it less likely to rupture with the ripening of the Graafian follicle, and a small cyst remains. Under the influence of disturbed circulation a large number of follicles may mature at once, producing a cystic ovary. The partitions frequently break down, and a large cyst is formed.

**ETIOLOGY.**—The principal causes of acute oöphoritis are—injury, septic poisoning after parturition or abortion, gonorrhea, arsenical or phosphorus-poisoning, the exanthemata, acute rheumatism, and long-continued endometritis.

Sepsis, without doubt, is the most frequent cause; the next frequent is gonorrhea. Septic inflammation is very likely to result in abscess and a more or less extensive peritonitis. The left ovary is more prone to be the seat of such a destructive process, due, according to some authors, to the difference in its circulation. Gonorrhea produces perioöphoritis with a binding down of the ovary by adhesions.

**SYMPTOMS.**—The patient complains of intense, lancinating pain, generally over the left inguinal region, associated with extreme tenderness, elevated temperature, rapid pulse, and frequent chills. In perioöphoritis the symptoms are less marked than are those of mild peritonitis.

**COURSE AND TERMINATION.**—Acute oöphoritis may terminate in resolution and disappearance of the abnormal symptoms, the development of an abscess, its rupture, and the occurrence of a rapidly-fatal infective peritonitis, or the disease may become chronic.

**TREATMENT.**—The treatment should consist in absolute rest in bed, the administration of salines until free purgation is secured. Tincture of aconite, gtt. j–ij every hour, is of value. Leeches may be applied to the perineum and an ice-bag to the seat of pain, or, where better borne, hot fomentations with opium, morphine given by the rectum, or where pain is very severe the morphine may be given hypodermically. When an abscess forms, the only acceptable treatment is surgical, as considered in the chapter on Pelvic Inflammations.

#### CHRONIC OVARITIS.

Chronic inflammation is much more common than the acute disorder. It occurs during the period of sexual activity, and more frequently in the married. The ovary may be enlarged, presenting

a number of cysts with little interstitial growth or increase of the fibrous tissue of the organ; subsequent atrophy, known as cirrhosis, occurs. The ovary may be fixed in the pelvis by an extensive infiltrate, so that it is immovable and scarcely to be distinguished, or it may be movable and prolapsed into the retro-uterine pouch.

**ETIOLOGY.**—Chronic ovaritis may be the sequel of the acute disease and due to the same causes. It is produced also by excessive sexual intercourse, masturbation, sexual excitement without gratification, suppressed menstruation, and to operations upon the cervix.

**SYMPTOMS.**—Pain is an inevitable feature, experienced with the greatest intensity in the groin and with the greatest frequency upon the left side. It is persistent, increased by locomotion, by a misstep, or by jolting. It is greatly exaggerated as the menstrual period approaches. If the flow is free, amounting to a menorrhagia, the pain is relieved or may disappear; if it is but slight, the pain increases. When the pain from any cause is intensified, it extends down the thighs and over the sacrum. Not infrequently pain is felt in one or both mammary glands of such intensity as to lead the patient to suspect the existence of malignant disease. Symptoms of spinal irritation and attacks of migraine are frequent near the menstrual periods. Hysteria or hystero-epilepsy may be an accompaniment. Sterility is an almost constant result. The ovaries are generally tender to pressure, though they may not be to any considerable degree enlarged. When prolapsed behind the uterus with that organ resting upon them, they are sensitive to the slightest pressure, and cause pain in defecation, and especially in coition. Frequently the marital relations are so painful and produce so much distress that they are necessarily discontinued. Physical examination must be conducted with great care. When the organs are prolapsed and fixed behind the uterus by inflammatory exudate, the careless observer may mistake the condition for retroflexion of the uterus.

**DIAGNOSIS.**—The determination of large and sensitive ovaries, exaggerated distress for a week or ten days prior to menstruation, mammary pain, with painful defecation and coition, leave but little room for doubt. When the physical signs obtained by vaginal touch are obscure, rectal examination will be of great service and should be a routine practice. Where the abdominal walls are rigid or the pelvic organs very sensitive, an examination under

anesthesia may be of value in supplementing or confirming the diagnosis.

**TREATMENT.**—Where it is possible, the removal of the sources of irritation which have led to the production of the disease should be the first consideration. The marital relation should be suspended or infrequently practised; vigorous exercise or long standing upon the feet should be avoided. The patient should rest in bed during menstruation. Blood may be abstracted by leeches to relieve severe pain. Counter-irritation with iodine, blisters over the region of the ovaries, or mercurial inunctions may be beneficial.

Internally, the administration of the potash salts, as the iodide, bromide, or chlorate, alone or in association with the bitter tonics, as nux vomica and cinchona or their alkaloids, strychnine or quinine, often give marked relief.

Benefit has been claimed from the following:

R<sub>x</sub>. Auri et sodii chloridi, gr.  $\frac{1}{20}$ ;  
 Extractum cannabis indicæ, gr. ss.—M.  
 Ft. cap.

Sig. Take one capsule three times daily.

FIG. 309.

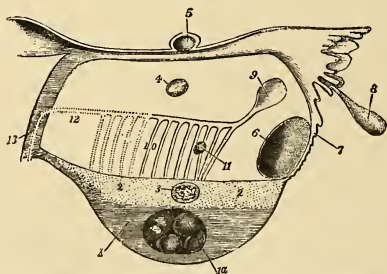
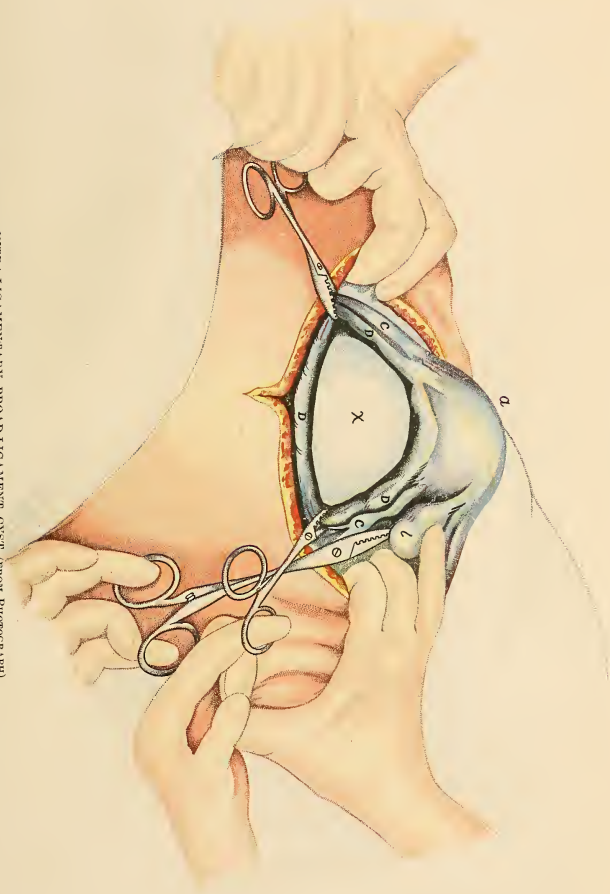


Diagram of the Structures in and adjacent to the Broad Ligament: 1, 1a, multilocular cystic tumor, developed in 1, parenchyma of the ovary; 2, papillomatous cystic tumor of the ovary in 2, tissue of the hilum of the ovary; 3, simple broad-ligament cyst, independent of the parovarium, 10, and the Fallopian tube; 4, a similar cyst in the broad ligament above the tube, but not connected with it; 5, a similar cyst close to 7, ovarian fimbria of the tube; 6, a similar cyst developed from the horizontal tube of the parovarium; 11, cyst developed from a ventricule tube (cysts of this kind form the papillomatous tumors of the broad ligament); 12, 13, tract of the obliterated duct of Gaertner (papillomatous cysts are said to be developed along this tract).

Ichthyol has frequently been found of service; its beneficial influence may be secured by administration by the mouth, by suppository, either vaginal or rectal, and through abdominal inunc-



INTRA-LIGAMENTARY BROAD-LIGAMENT CYST (FROM PHOTOGRAPH).

- A* Uterus.  
*B* Right ovary.  
*C, E* Fallopian tubes.  
*D, D, D* Edges of incised peritoneum held open  
 with hemostatic forceps.  
*X* Cyst.



tion. Fixation of the ovaries may be overcome by the judicious use of pelvic massage. The severity of the attacks of pain may be much ameliorated by the administration of ten drops of tincture of *pulsatilla*, four times daily preceding the expected attack, and continuing it until the menstrual flow has been well established.

In severe cases, or where all palliative measures have failed to ameliorate the distress, and the general health is being gradually undermined, the offending organs should be removed.

#### OVARIAN NEOPLASMS.

The neoplasms of the ovary may be divided clinically into cystic and solid growths. The cystic tumors include simple, proliferating, and dermoid cysts. The solid tumors are fibromata, sarcomata, and carcinomata, and are comparatively rare. Cysts may originate in any part of the tubo-ovarian structure, as the cortical, medullary, or parenchymatous structure of the ovary; in its inferior border or hilum; in the structures between the tube and ovary known as Rosenmüller's organ or the parovarian structures; and in the hydatid of Morgagni, the extremity of the canal of Müller. Cysts are developed also in the folds of the broad ligament, and are known as broad-ligament cysts. The cysts may be unilocular with limpid contents, or multilocular with contents varying in different cysts, some clear and

FIG. 310.



Broad-Ligament Cyst, Fallopian Tube and Ovary.

limpid, others thick and viscid or discolored with the admixture of blood, pus, or fat. The broad-ligament cysts are generally unilocular, containing clear fluid; those originating in the hilum, papillary; and in the parenchymatous tissue of the ovary, glandular.



The cysts may be divided pathologically into simple, proliferating, dermoid, and parovarian, or, according to size, into small and large cysts.

Under small cysts may be described, first, small residual cysts developing from Morgagni's hydatid or the horizontal canal of the parovarium; second, follicular; third, cysts of the corpus luteum; and fourth, tubo-ovarian cysts.

The large cysts include, first, the glandular proliferous; second, the papillary proliferous; third, dermoid, simple or mixed; fourth, parovarian, including several varieties, as hyaline, papillary, and dermoid.

*Cysts of the Hydatid of Morgagni.*—Attached to the fimbriated end of the Fallopian tube is generally found a cyst varying from the size of a pea to that of a cherry. It is transparent and has a thin wall. This hydatid is the remains of the extremity of Müller's canal, and is rarely absent. The length of its pedicle varies in dif-

FIG. 311.



Cyst of the Organ of Morgagni.

ferent individuals. It is sometimes nearly an inch in length, and very thin; in other cases it is short and thick. Doran describes a supra-tubal cyst about the size of the former and of the same appearance and structure. It is supposed to be a micro-cyst of the broad ligament which has slipped under the serous membrane and attained this unusual position.

*Micro-cysts of the Broad Ligament.*—These are small cysts which develop in the structure or are suspended from Rosenmüller's organ: other cysts are found free and are of undetermined origin. Only those which originate from the vertical tubes of the parovarium have ciliated epithelium, and are likely to subsequently develop into

papillary growths. The others, and even those which start in the horizontal tube, may become detached from the broad ligament and hang by a slender pedicle. These micro-cysts may possibly be the starting-points for large cysts with either fluid or papillary contents.

*Simple or Follicular Cysts.*—These cysts are formed from unruptured Graafian follicles which become dilated. In an ovary which has not attained to twice its normal size may be found fifteen or twenty of these cysts. They were long considered as the only source of large ovarian cysts. It has, however, been discovered that it is only in rare cases that they attain to the size of a fist, or at the utmost to that of a man's head. They contain a light serous fluid with a specific gravity of 1005 to 1020. The cyst-wall is thin, has a light-gray color, and is in large part a transparent membrane. The disease is generally bilateral.

*ETIOLOGY.*—These cysts, even when of large size, are regarded as dilated Graafian follicles, because of the different gradations observed between them and the smaller cysts. In the smaller size ovula may be detected, which may have been destroyed or have escaped observation in the larger.

Dropsy of the follicle is occasioned by its failure to rupture with the increase in its fluid contents. The rupture may be prevented by its deep situation, thickening of the tunica albuginea, or deposits of peritonitic exudation over the surface of the ovary. It may also be caused by too slight a menstrual congestion, which, though increasing the secretion, is insufficient to produce rupture.

*Cyst of the Corpus Luteum.*—This cyst was first described by Rokitansky, who believed that the corpus luteum of pregnancy only could be transformed into a cyst, but such cysts have been found in the nulliparæ. They are generally not larger than a walnut, but cases have been described in which they have attained the size of an orange or an apple. Nagel even speaks of one which had reached the size of the adult head. Microscopical examination shows in the walls the bud-like papillæ characteristic of the corpus luteum. The recognition of this prevents their confusion with follicular cysts, or even with suppurative ovaritis.

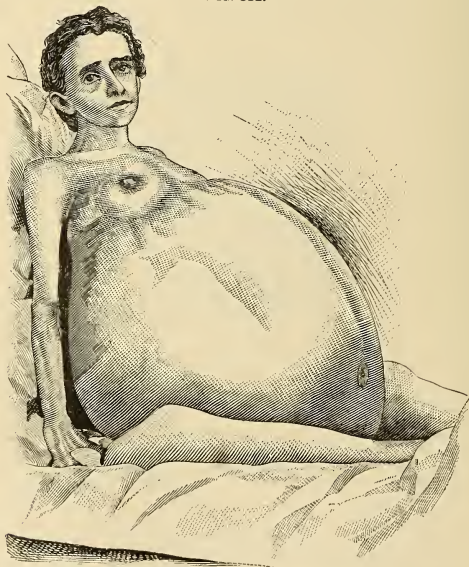
*Tubo-ovarian Cysts.*—The presence of an ovarian cyst not infrequently results in the formation of a tubo-ovarian cyst through its proximity to a distended tube. Tubal inflammation early results in fastening the ostium of the tube to the ovary by firm adhesions. A dilated follicle or a small cyst may readily rupture into a distended

tube, with which it is in juxtaposition, and form one sac, the smaller part of which is generally furnished by the tube. It does not usually attain to a large size. The Fallopian tube may remain permeable, and as the fluid increases the overflow passes into the uterus; a condition known as profluent ovarian hydrops is thus formed. It may be compared with the condition engendered by hydrosalpinx known as profluent hydrops tubæ. The open tube may act as a safety-valve, preventing the growth and over-distension of the cyst, and in some cases leading to its complete prolapse after every evacuation.

#### LARGE CYSTS.—PROLIFERATING CYSTMATA.

The term "proliferation," as applied to cysts, refers to those which are highly organized and abundantly supplied with blood-vessels.

FIG. 312.



Large Ovarian Cyst, weighing 149 pounds.

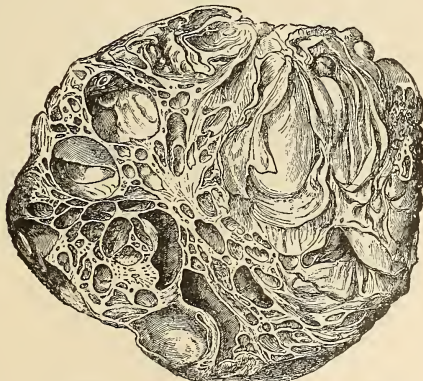
The term "proliferous cysts" is also applied to them, and indicates their faculty of budding and generating new cysts from or within

the original growth. In shape they may be spherical and regular in outline, simulating the presence of a single cyst, or irregular, presenting nodules, indicating a multilocular tumor.

They may vary from the size of an egg to that of a tumor weighing more than one hundred pounds, filling up the entire abdomen and encroaching upon the thoracic viscera. When exposed the cysts present a pearly-white, glistening appearance. The thinner portions are purple, green, or black according to the color of their individual contents. The external surface may be smooth and oily, covered with papillary growths or mucous vegetations. The tumor generally has a distinct pedicle. The consideration of the internal structure of ovarian cysts justifies their division into areolar, unilocular, and multilocular.

*Areolar.*—When an areolar cyst is opened it is found filled with spurs or trabeculæ of small cysts which have ruptured to form a large main cyst, or it may be made up of a large number of small

FIG. 313.



Proligerous Glandular Ovarian Cyst of areolar appearance.

cysts bound together by loose connective tissue almost gelatinous in appearance. In a tumor of this kind, removed from a young woman, a large number of small cysts were found. Although the tumor was as large as a pregnant uterus at full term, it contained no cyst larger than a good-sized plum.

*Unilocular* cysts attain to an enormous size, but are found to

contain evidences of previous division into smaller cysts, and it may be asserted that all unilocular cysts arise from the multilocular: even in the large tumors close examination will disclose small cysts in their walls.

FIG. 314.



Multilocular or Glandular Cystoma.

*Multilocular* cysts are so called because they contain a number of cysts of nearly equal size, so arranged as to present the appearance of one large cyst.

The cyst-wall can be divided into three layers—an outer and an inner of fibrous, and a middle layer of connective tissue. In the latter the vascular supply is distributed, and it sometimes contains vessels as large as the femoral vein. In areolar cysts these vessels can be seen coursing upon the surface, and when wounded may cause dangerous or even fatal hemorrhage. Large vessels are frequently found free in the gelatinous contents of large cysts, and remain after the destruction of the former septa. Such vessels may be the source of hemorrhage into the cyst.



The external surface of the cyst is covered by columnar epithelium differing from the pavement epithelium of the peritoneum. The internal surface is lined by low cylindrical cells. Section of the cyst-walls shows depressions of the endothelium resembling acinous glands with a narrowed opening. The lining membrane may be covered with vegetations formed from proliferated stroma, simulating myoma or fibro-sarcoma. These tufts are covered with a single layer of endothelium. Epithelial prolongations of a tubular form may penetrate from below upward, presenting the appearance of carcinoma.

The contents of the cysts often present marked contrasts in

FIG. 315.



Portion of an Ovarian Adenoma, showing the varieties of loculi: *c*, primary; *d*, secondary.

color or consistency; thus they may be found either almost colorless, straw-colored, green, purple, or black in color, thin, and thick, viscid, or gelatinous in consistency. The contents may vary in color and consistency in different cysts of the same tumor. The fluid in the smaller cysts is generally more consistent and becomes thinner as they increase in size, the result of changes in the structure of the epithelium.

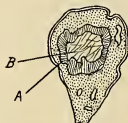


Proliferating cysts may be divided into two classes: first, those in which the vegetations are derived from the epithelium and from glandular tubes, proliferous glandular cysts, or adenomata; second, those in which the connective tissue of the walls develops and projects as vegetations—proliferous papillary cysts. These cysts do not differ essentially in their origin.

The walls of the cysts may undergo the following degenerative or retrogressive processes:

1. **CALCIFICATION** most frequently take place in the inner layer of the main cyst-wall as deposits of granules or small plates of lime or the formation of psammomatous bodies, as seen in the papillary cystomata. The calcification increases with impairment of nutrition, as occurs in gradual torsion of the pedicle.

FIG. 316.



Calcified Corpus Luteum: A, calcified portion; B, interior of the corpus luteum.

2. **FATTY DEGENERATION** occurs in the papillary cells, which are regenerated, while the desquamated fatty cells are destroyed. A similar change takes place in the connective tissue and walls. The process is enhanced by any impairment of nutrition. The pressure of cyst-contents induces this change in the septa, resulting in their partial or complete destruction. The presence of a large amount of fat in the fluids is indicative of slow growth.

3. **ATHEROMATOUS** changes, which generally take place in the inner layer of the wall.

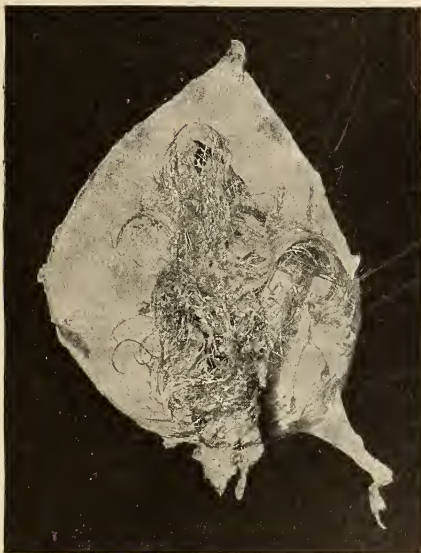
4. Changes due to infarctions in which whitish opaque bodies will be found in the septa surrounded by a red zone.

*Papillary Cystomata.*—These cysts were formerly regarded as a variety of the glandular. They are believed to have developed from the paroöphoron, in the broad ligament, or in the prolongations of its tumors into the hilum of the ovary. They differ from ordinary ovarian or oöphoritic cysts in that, first, they produce no effect upon the shape of the ovary until they have attained a large size; second, they burrow beneath the layers of the mesosalpinx, and when of large size separate the layers of the broad ligament beside

the uterus; third, their interior is filled with warty growths. These warts form cauliflower growths, or masses which over-distend and rupture the cyst-walls, from which they extend to the adjacent organs, particularly the peritoneum. The cysts rarely attain to large size, and in the majority of cases are bilateral.

When the cyst ruptures, the dendritic masses infect the peritoneum, producing growths upon the adjacent tissues. These are

FIG. 317.



Dermoid Cyst containing long red hair, removed from a light-haired woman aged 44 years.

reddish or pearly-white and glistening masses, or in some cases growths three or four inches long projecting in every direction and having the appearance of stems of coral. These masses have usually partly undergone calcification, so that they break easily and without bleeding.

These tumors are characterized by slow growth, by frequent and early pressure-symptoms, and generally by the early presence of ascites, which soon returns after puncture.

The writer has had a number of cases of the growths under observation. In a recent one the involvement was bilateral and beneath the peritoneum, dissecting it off from the posterior surface of the uterus and obliterating the retro-uterine cul-de-sac. A large quantity of ascitic fluid was drawn off, when the entire peritoneum, parietal and visceral, was found studded with small red masses. In another patient the entire surface of the uterus and broad ligaments was covered with dendritic masses three inches long, which had become partially calcified. Specimens of such growths are represented in the illustrations. The danger of peritoneal infection precludes tapping when there is any reason to suspect such a growth.

*Ovarian Dermoids.*—Dermoid tumors are those in which are found skin or mucous membrane associated with the structures generally connected with such tissues. The tissues most frequently found are hair, teeth, nails, sebaceous and sweat-glands, and mammae, horn, bone, unstriped muscular fibre, and, in rare cases, a tissue resembling brain. The hair varies in color, length, and quantity. It is not always of the same color as that of the person from whom the tumor is removed. The sebaceous glands are numerous and produce an extensive accumulation of fatty material. The teeth are irregular, generally imperfectly formed, though presenting the structures of dentine and enamel. They vary in number from two or three to several hundred. They may dot the surface of a membrane or be inserted in thin spicula of bone. The bone is generally loose, ill-formed, and irregular.

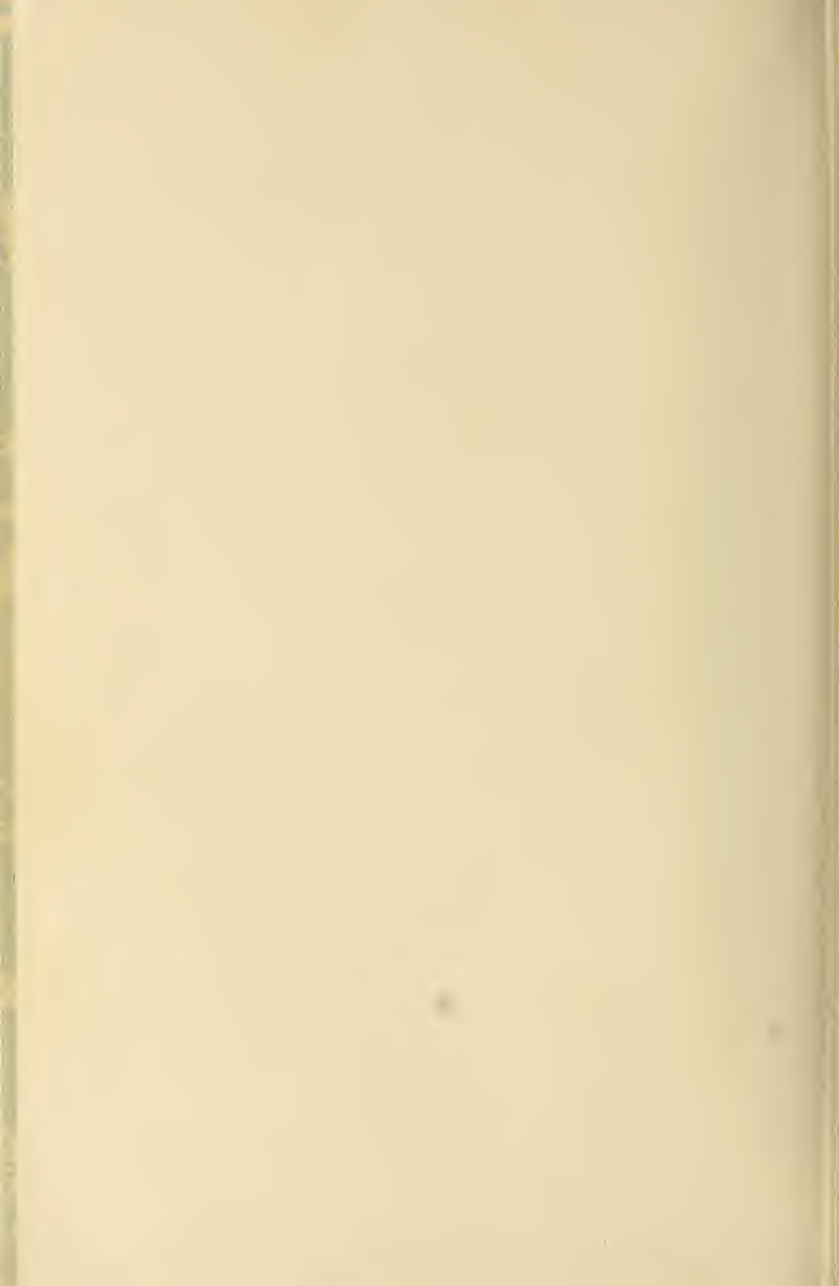
These growths may appear at any age. They have been found in children at birth and in women of ninety years. A tumor removed from a girl aged eleven years had been noticed when but eight years of age. It involved both ovaries, and the fundus was imbedded in the mass. The neck of the uterus was made to form the pedicle. The tumor contained a large quantity of sebaceous material—hair, bone, teeth—and at one point a mass resembling one side of the upper jaw covered with mucous membrane and containing a row of teeth.

The specimen represented by Fig. 317 was removed from a woman aged forty-four years, who had given birth to six children. It contained hair and sebaceous material. Cullingworth reports a woman, in whom both ovaries were apparently involved by dermoids, who had given birth to twelve children and had three miscarriages—the last, three months before the removal of the growths.

PLATE XXXVII.



Dermoid Cyst Laid Open, showing Maxillary Bone containing teeth ; the head of one of the long bones ; skin with hair growing from its surface ; serous membrane (probe passed underneath) ; mucous membrane of stomach directly next to serous membrane.

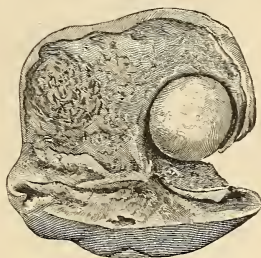


The rupture of ovarian dermoids is followed by peritonitis. The irritating character of their contents contraindicates puncture prior to their removal. The writer has seen a case in which an attempt at aspiration was followed by an attack of peritonitis which proved fatal, notwithstanding that aspiration was followed three days later by ovariectomy.

#### SOLID TUMORS OF THE OVARY.

The solid growths of the ovary comprise 5 per cent. of the cases which present themselves for operation, and may be divided into three groups: the fibro-myomata, sarcomata, and carcinomata. The first, *fibro-myomata*, are frequently divided into two groups: the fibromata and myomata. The former are rare, and comprise those growths in which the minute structure consists of wavy bundles of fibrous tissue closely packed, intermixed with small round cells. In a few instances these growths attain a large size. Williams described

FIG. 318.



Calcified Fibroma of the Ovary.

one which weighed seven pounds seven ounces; Doran, one of seventeen pounds. The *myomata* are more frequent than the former, but are not common. These tumors are prone occasionally to undergo calcareous degeneration, and are under these circumstances often mistaken for osseous tumors—a variety of ovarian degeneration which rarely if ever occurs.

Unstriated muscular fibre occurs in the ovary as a continuation of the ovarian ligament. Tumors of the ovary composed of this tissue sometimes attain to a large size. Sutton mentions a specimen in the Museum of the Royal College of Surgeons removed from a woman aged 68 years, which weighed fifteen pounds two ounces.

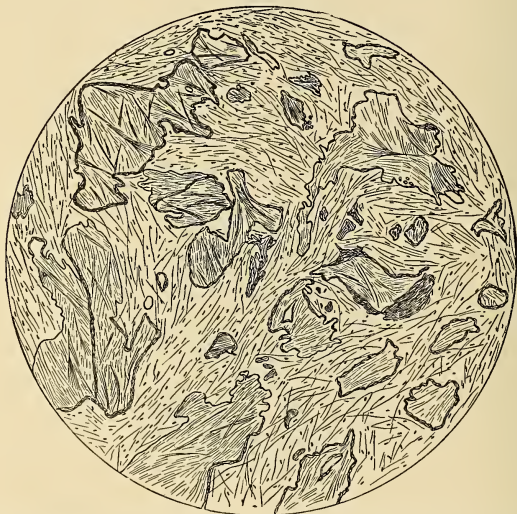


*Sarcomata* and *Carcinomata* are fully described in the chapter on Malignant Diseases.

#### PAROVARIAN CYSTS.

Cysts of the parovarium may be divided into those which occur in the outer series of tubules free at one extremity and known as Kobelt's tubes, an inner set of vertical tubules, and lastly a large tube running at right angles to the vertical tubes may be occa-

FIG. 319.



Showing the Structure of Calcified Fibromata. The darker portions represent areas of calcification.

sionally traced downward to the vagina. This is Gärtner's duct. There are two kinds of cysts which arise from the parovarium; the most frequent are the small pedunculated cysts connected with Kobelt's tubules, which do not become larger than a pea, and consequently have no clinical importance. The most important are the sessile, which remain between the layers of the mesosalpinx, and as they enlarge burrow into it. In these large cysts the Fallopian tube becomes elongated. Small cysts are usually transparent; when they become larger than a cocoanut this appearance is lost. The fluid is clear, limpid, with a specific gravity of

1010 and an alkaline reaction. They are distinguished from the ovarian cysts, first, by the ease with which the peritoneal coat can be stripped off; second, by the ovary being generally found attached to the side of the cyst; third, by the cyst being unilocular; fourth, by the Fallopian tube being stretched over the cyst and never communicating with it; fifth, by the specific gravity which does not exceed 1010, and may be lower; and lastly, in the same specimens, by the tissue of the mesosalpinx which becomes gradually thickened. These cysts rarely occur before the age of sixteen; they probably form about 10 per cent. of the cysts which are subjected to operation. They generally do not form adhesions, and rarely suppurate even when tapped.

*Pedicle.*—In all varieties of cysts of the ovary or the broad ligament the presence, absence, or character of the pedicle is of great surgical importance. It may be thin, almost membranous; long and narrow, consisting only of the folds of the peritoneum or of peritoneum and elongated tube; or may be broad and thick, comprising the entire broad ligament. Its length and thickness will depend upon the proximity of the cyst to the uterus. The pedicle consists of two parts—the ovarian ligament and the Fallopian tube.

The thick pedicle may consist of the broad ligament, hypertrophied and reinforced by muscular tissue from the uterus. When there is no pedicle the tumor has developed wholly within the broad ligament. The tumors of the broad ligament, some dermoids, and glandular cysts of the ovary are of this class.

In the recent removal of cysts of this character the peritoneum is separated from the posterior surface of the uterus, while the tumor dips down upon the left side of the uterus to the roof of the vagina, leaving a large membranous cavity.

*ETIOLOGY.*—Ovarian cysts may occur at any age, and are not infrequently found in the fetus. Doran describes fetal ovaries which contained cysts  $\frac{1}{12}$  to  $\frac{1}{6}$  of an inch in diameter, lined with cylindrical epithelium and filled with dendritic vegetations. Congenital ovarian cysts may be either unilocular or multilocular, unilateral or bilateral. Sutton analyzed 60 cases in children under fifteen years of age, in which he found 23 dermoid, 16 sarcomata, and 16 simple cysts. Thornton has observed cases in which malignant deposits were found in the pelvis two or three years after the removal of dermoid cysts, that contained soft white growths strongly resembling sarcomata.

Sutton arranges the group of malignant tumors in children—termed by some sarcomata, others carcinomata—under the term *oöphoromata*, because they seem to arise from the tissue of the *oöphoron*. Ovarian growths occur with greater frequency during the age of sexual activity, between the twentieth and fiftieth years. They are comparatively rare after sixty, and still more so before puberty. The unmarried seem to suffer with greater frequency from these growths. It is probable that the cessation of ovulation during pregnancy and lactation acts as a safeguard against their development, while menstrual congestion favors it. Several members of the same family have been affected. Each ovary seems to be attacked with equal frequency. It is estimated that the ordinary cystomata occur bilaterally in about 3 per cent., while the malignant, on the other hand, are found bilateral in about 75 per cent. Scanzoni has considered chlorosis during puberty as a main element in their development.

**SYMPTOMS.**—The tumor usually develops insidiously, and may attain considerable size before it is discovered, being then, possibly, noticed by accident. The earliest symptoms are vesical tenesmus, constipation, pain in defecation, and the sensation of weight and pressure in the pelvis. As the tumor increases in size general nutrition becomes affected, due to the pressure upon the stomach and diaphragm. The patient becomes emaciated, grows weak, and suffers from violent abdominal pains, produced possibly by a partial peritonitis. Edema may occur in one or both legs and extend to the vulva or lower abdominal walls. The patient may have intercurrent febrile attacks, and death may occur from exhaustion, or where the tumor fills the pelvis it may produce incarceration similar to that resulting from retroversion of the pregnant uterus.

Olshausen divides the subjective symptoms into four classes or groups: First, those produced by violent disease. This may be dysmenorrhea, but more frequently early and excessive hemorrhage. Excessive menstruation in bilateral tumors and tumors of the broad ligament is an early and obstinate symptom, due to the pressure upon the pelvic veins. Ergotin and other agents are useless in controlling the bleeding. This hemorrhage produces anemia. Sterility may result from the disease, partly from physiological and partly from mechanical causes. The fact must not be overlooked that conception has occurred with both ovaries occupied by large dermoid cysts. The presence of tumors may cause

pigmentation of the mammary areola and the linea alba, painful sensation in the breasts, and even enlargement of these organs, with the secretion of milk. Second, symptoms which result from depression or weight of the tumor. These are constant after it has attained to some size. When it is situated in the pelvis it may produce tenesmus or strangury by pressure upon the neck of the bladder. A large tumor may produce upward traction on the bladder and urethra, and cause vesical disturbances, and even retention of urine. Defecation is impeded by pressure, and becomes painful if the tumor is sensitive. The patient suffers from vague, dragging pains, rupture of the rete Malpighii, and consequent formation of linea albicantes, dilatation of the veins, œdema of the abdominal walls, compression of the stomach and intestines, and difficult breathing by pressure against the diaphragm. This pressure necessarily adds an increase of danger to any inflammatory trouble of the lungs. As a result of compression of the renal veins and ureters the patient may suffer from albuminuria or from suppression of urine by the compression of the ureters. The compression of the large abdominal veins causes marked œdema of the legs, though this is less frequent than in pregnancy. The tumor must be larger than the pregnant uterus to cause these symptoms. Third, symptoms of complicating disease. Of these the most frequent and important are those which arise from attacks of circumscribed peritonitis. These symptoms are usually found in large tumors where they extend above the umbilicus. Loss of a portion of the superficial epithelium of the tumor necessarily results in its adhesion to adjacent parts. The greater the pressure of the tumor against neighboring organs, the more readily will the friction produce adhesions. This is more likely to occur in the anterior surface of the tumor, producing adhesions between the tumor and anterior parietes. Next in frequency are omental adhesions, and then follow adhesions to the intestine, bladder, uterus, spleen, stomach, liver, and floor of the pelvis. These produce attacks of pain, lasting for days or weeks, with tenderness of the parts affected. Other complicating symptoms are pressure upon the intestines, producing intestinal irritation or obstruction; intestinal occlusion from pressure upon the rectum, or occasionally, after puncture, from twisting of the intestines where they have been adherent. Fourth, symptoms on the part of the general condition of the patient. The general health of the patient usually remains good until the digestion is

impaired by pressure upon the stomach. Then marasmus occurs, appetite is lost, the tongue becomes dry, there is persistent vomiting, and the features become sunken; the expression of the face with the enormously distended abdomen presents symptoms which usually indicate the presence of the disease.

Before taking up the study of the objective symptoms or physical signs of ovarian cysts we will enter upon the consideration of complications arising from changes in the cyst itself. These are—first, hemorrhages; second, suppuration and gangrene of the cyst; third, adhesions; fourth, torsion of the pedicle; fifth, rupture; sixth, metastatic deposits.

*Hemorrhage* into the cyst occurs from a variety of causes. It may take place in papillomatous cysts if the superficial vessels are greatly distended, or from the cyst-wall where the veins have ruptured by dilatation. The most frequent cause is from torsion of the pedicle. Moderate torsion interferes with the return of the blood through the veins, while the arterial circulation may still be maintained. It may take place from puncture through injury to a large vessel in the cyst-wall. Hemorrhage usually occurs slowly and in small quantities, and consequently is of no prognostic significance. Where copious, as in acute torsion of the pedicle, or where large vessels are punctured, it may seriously threaten life and produce profound and dangerous collapse.

*Inflammation and suppuration of a tumor* may be produced by a number of conditions. Thus they may result from infection through the intestinal canal, urinary bladder, Fallopian tube, or the admission of air in tapping. This may affect small as well as large cysts. Dermoids are especially prone to suppuration. The most common avenue of infection is through the Fallopian tube. Adhesions generally take place in the immediate neighborhood of its ostium, affording opportunity for inflammation to extend over the cyst, thus causing adhesions to the omentum, intestines, and parietal peritoneum. The intestines are sometimes the source of infection through adhesions of the small intestine or the rectum to the cyst-wall. As the adherent piece of intestine becomes compressed by the tumor, its wall becomes thinned, allowing the diffusion of intestinal gases. It may become so thin as to permit the gas to pass directly into the cavity of the cyst, causing putrefaction and converting it into a huge abscess; in some cases the inflammation has originated in an appendicitis. It was formerly supposed to be due invariably



to the accidental admission of air through tapping, but, as we have seen, it may occur independently of that cause. In acute cases, where inflammation results in early adhesions to the surrounding structures and viscera, marked symptoms arise, and unless the pus finds exit the patient dies. When exit is afforded, the patient may be worn out by the prolonged discharge.

**SYMPTOMS** are pain, tenderness over the region of the tumor, rapid and feeble pulse, great emaciation and exhaustion, with a temperature of  $102^{\circ}$  in the morning,  $103$ – $106^{\circ}$  in the evening, or where the patients have become greatly exhausted the temperature may fall as low as  $95^{\circ}$ , especially when the pus is in considerable quantity. The urine may be found to contain albumen, and the cyst, through its communication with the intestine, may contain gas, producing a tympanitic note. Suppurating dermoids are not of infrequent occurrence, often cause extensive adhesions, and burst into the peritoneum, rectum, bladder, vagina, or even through the abdominal wall. Communication of such a tumor with the bladder excites profound distress. Portions of bone, teeth, locks of hair, or sloughs become packed in the urethra, and cause retention of urine and the occurrence of cystitis. Fragments remaining in the bladder are covered with phosphatic deposits and form a nucleus for the formation of calculi.

*Adhesions*, when extensive, are always a source of additional anxiety. When they have existed for some time between the intestines, colon, and cyst-wall, forming broad, fibrous bands of close adhesions, the task of removal is an exceedingly tedious, and occasionally an impossible one. The adhesions result from inflammation of the surface of the peritoneum, the exudation from which is slowly converted into fibrous tissue. If the parts remain in contact during the formation of the adhesions, what is known as a sessile adhesion is produced. If movement is kept up, the bands of adhesions are elongated, forming broad or narrow bands. The cyst may present a shaggy appearance from extensive adhesions. The older adhesions contain blood-vessels, which are of large size when the intestine or omentum is involved. The vessels thus formed are frequently so large that when a pedicle has been destroyed by torsion the tumor is still nourished by its new relation. The most dangerous adhesions are those in the pelvis, on account of their intimate relation with the iliac arteries and veins, and it is in many cases exceedingly difficult, if not impossible, to determine



their presence until operation is resorted to. In separating pelvic adhesions in a patient sixty-three years old, some years ago, using but very slight force, a large vein was torn open, and the patient lost so much blood before the hemorrhage could be arrested that she died a few hours later from shock.

*Axial rotation, or torsion of the pedicle*, occurs in probably 10 per cent. of the cases. It has been attributed to a variety of causes, as the alternate distension and evacuation of the bladder, passage of feces through the rectum, sudden movements, unusual exercise, the occurrence of pregnancy, delivery of the patient, and so on. It is more likely to occur in double ovarian tumor. It is possibly also induced by changes of position of the patient. The rotation varies from half a circle to as many as ten or twelve complete twists. The rotation takes place from right to left or left to right with about equal frequency, dependent, possibly, upon the side on which the tumor is situated. The tendency is to rotate toward the median line rather than from it. The effect on the circulation depends upon the amount of torsion as well as upon the thickness of the pedicle. A long, thin pedicle is the most frequently twisted. The veins are the first to suffer from the twisting, causing acute enlargement of the cyst from extravasation of blood into its cavity. The veins may rupture and hemorrhage take place into the cavity of the cyst—hemorrhage so profuse as to produce acute anemia and even death. On opening the abdomen of such a patient, the cyst will be found dark-colored, more particularly near the pedicle. The fluid in the cavity may be chocolate or dark-red in color. The most frequent effect of torsion is thrombosis of the vessels, extravasation of blood, and necrosis. Necrosis is followed by decomposition and putrefaction of the dead tissues.

Torsion may be acute or chronic. In the latter the changes are slow. Acute torsion is generally seen in small tumors. The larger the tumor, the more profound is the constitutional effect. Symptoms of acute rotation are frequently so marked as to leave no question as to the condition. When the patient complains of sudden and violent pain in the abdomen, vomiting, and the presence of acute swelling, one should suspect its occurrence. This is still more probable if the woman be pregnant. The rupture of the gravid Fallopian tube may induce symptoms which would be mistaken for torsion. The indications for prompt relief, however, are the same in each case. The symptoms in the chronic variety are not so marked.

The patients complain of a dull, sudden abdominal pain, and still maintain good health, with a tumor, however, which more rapidly increases in size. In these cases the prognosis is good if the adhesions are few or slight.

*Rupture of the Cyst.*—Rupture of the cyst may be sudden, as the result of a fall, blow, or injury, or gradual from change in the cyst-wall. In the latter the cyst becomes thinner, more particularly in the papillary proliferating cystomata. In such growths, as they increase in size, the accumulation presses upon their walls, which become thinned, until they give way at some point or until the papillary growths project through the thinned walls. Rupture of the cyst may take place into adherent viscera, but more generally occurs into the peritoneal cavity. The result of such a lesion is dependent somewhat upon the quantity and quality of the fluid contained. In the *unilocular* cysts the fluid is most innocuous, and may frequently produce no abnormal symptoms other than an increased diuresis. The patient probably passes several gallons of water in twenty-four hours. The abdomen, so prominent from the tumor, becomes flattened, flabby, and possibly the remnant of the cyst may be recognized upon palpation. Rarely the cyst-wall may shrivel and a radical cure be effected. In the multilocular cysts, and particularly the dermoids, rupture into the peritoneal cavity may be followed by infection, a rapidly developing grave peritonitis, and finally death. This termination is quite probable, not only in dermoids, but in those containing colloid material, or particularly where pus is present in the cyst. In dermoids the decomposing fat is eminently productive of inflammation. Death may be very rapid as a result of shock or the absorption of the deleterious material. In papillary cystomata rupture results in the infection of the peritoneal cavity and the formation of growths upon its surface, in some cases studding the entire peritoneum. Rupture is determined by disappearance of the tumor, diminution in its size, demonstration of free fluid in the abdomen, peritonitis, collapse, and diaphoresis or diuresis. Rupture into the peritoneal cavity may be mistaken for torsion; when into the intestines, it is recognized by the evacuation of colloid masses or chocolate-colored fluid; where the opening is high up, violent watery diarrhea may occur; when into the bladder, by vesical tenesmus and dysuria; or where dermoid, it is recognized by the peculiar contents of the cyst. External rupture is usually determined without difficulty. When pus or ichorous

material alone are discharged, it is sometimes difficult to determine whether it proceeds from a cyst or an abscess in the walls.

Metastasis occurs in cancer of the ovary extending to the peritoneum, causing ascites, or secondary nodules may be found in remote organs, as the liver, spleen, and, rarely, the kidney. In papillary growths the peritoneum becomes infected, and through the peristaltic action may infect the entire abdomen. So extensive is the infection, and so prone to occur after the removal of these tumors, that it has been sometimes questioned whether papillary tumors did not belong to the malignant class. Their structure, formation, and the fact that they are not always absolutely fatal renders this improbable. The dermoid element has also been found implanted in the peritoneal cavity. Small tufts, covered with hair, have been noticed growing from the surface of the peritoneum of the intestine. A similar covering with colloid material has been found in multilocular cysts.

In a case operated upon by the writer some years ago the entire peritoneal cavity was studded with a thick colloid material which could not entirely be scraped off.

Other complications of ovarian cyst are—

1. *Ascites*.—A small amount of ascitic fluid may be present with many cysts, but a large quantity is rare so long as the tumor retains its normal condition. Changes in its structure, especially if of malignant character, are prone to result in an increase of free peritoneal fluid. In malignant disease the fluid becomes darker, like prune-juice.

Large ascitic accumulations result from rupture of colloid or particularly of papillary cysts. Solid growths are generally attended with ascites. The presence of fluid in the peritoneal cavity is by no means an indication of malignancy, as it occurs in fibromata as well as in sarcomata and carcinomata. In the former it is probably due in part to the irritation of the peritoneal epithelium and in part to pressure upon the vessels.

2. *Intestinal obstruction or strangulation from pressure of the cyst* or adhesions to its surface, or torsion or volvulus from such adhesions takes place when the tumor has been reduced by puncture. The intestine may become occluded by extension of malignant disease.

2. *COURSE, DURATION, AND TERMINATION*.—The rapidity of the growth of an ovarian tumor depends somewhat upon its character. Those of slow growth are usually cysts of the broad ligament,

fibromatous tumors, and the fibro-myomata of the ovary. Proliferating cysts, whether glandular or papillary, grow more rapidly. The latter grow so rapidly that considerable increase in size may be noticed in ten days. The intra-ligamentary cysts of papillary origin are generally of slow growth. At the end of years they may not be larger than a child's head. Such patients suffer from profuse menstruation, due to the pressure upon the veins obstructing the return circulation. In the later stages ascites is developed, which rapidly returns after tapping. It is difficult to determine the duration of the disease where undisturbed. In 60 to 70 per cent. at least of the proliferating cystomata the patient dies within three years after the advent of the first symptoms, and another 10 per cent. die within four years. The slow-growing papillary cystomata generally cause the death of the patient from marasmus, but the average duration of the disease is longer than in the proliferating variety. Such a patient has been punctured one hundred and five times in seven years, with the removal of twenty-five to forty pounds of fluid at each operation. The proliferating cysts may remain unchanged even for years. Patients suffering with ovarian cysts may heal spontaneously or pass into a condition which is equivalent to recovery. Spontaneous recovery generally occurs from rupture of the cysts. This favorable result occurs more particularly in simple cysts, but rarely, if at all, in the proliferating.

Torsion of the pedicle, or axial rotation, may bring about recovery in colloid tumors. Such a termination, however, is rare, and the recovery is not absolute, as there usually can be found a mass in the former position of the tumor. Spontaneous recovery, indeed, is rare, even in unilocular cysts, and in the proliferating cystomata is never looked for. Unless such patients are subjected promptly to surgical treatment, death occurs in the majority of cases from exhaustion, as a result of anorexia, impaired digestion, sleeplessness, and interfered respiration and circulation. Patients may suffer from bed-sores or intercurrent disease, which may rapidly prove fatal. Death is occasioned in other cases from peritonitis after torsion of the pedicle, rupture, or metastasis upon the peritoneum. Other fatal conditions may be intestinal occlusion and embolism of the pulmonary artery. The presence of ascites in considerable quantity is generally an unfavorable omen. Another cause of fatal result may be suppuration from puncture. This result was formerly very frequent. The presence of ascites must be

considered an unfavorable symptom when it is associated with papillary growths or rupture of a glandular tumor. A tumor which has not been long in existence and which undergoes sudden development, attended with rapid emaciation and cachexia, multiple adhesions, especially in the pelvis, and œdema of the lower limbs and the abdominal walls, with peritonitic complication, should indicate a malignant onset. In such cases the outlook for a successful operation is bad, although operation should be done wherever there is the least chance for success.

The PHYSICAL SIGNS of the patient are determined by inspection, palpation, percussion, and auscultation. In the examination of the patient she should be placed upon a bed or couch, the limbs drawn up, clothing loosened, all constricting bands removed, so that the abdomen can be thoroughly and completely exposed. It is well that the patient should have been previously directed to have the bowel and bladder emptied. After covering the lower extremities with a sheet, and bringing it over the lower part of the abdomen so as to avoid exposure of the genitalia, the abdomen is bared. The first general procedure in examination is that of inspection. By inspection we are enabled to determine the size of the growth, the height to which it rises from the abdomen, its position, whether symmetrical or one-sided, the smoothness of its outline, whether spherical or larger from side to side, the appearance of the skin, presenting the *linea albicantes*, darkened line down the centre—the *linea nigra*—discolorations of the skin indicating the application of counter-irritants and the presence of pre-existing inflammatory troubles. An irregular nodular appearance of the tumor would indicate that if cystic it consisted of a number of cysts causing irregularity of the surface. The dark line is generally considered a symptom of pregnancy, but when it occurs it is permanent in duration, so that it is only in the first pregnancy that it is of value. It should not be forgotten, however, that this increase of the local pigment occurs in women who suffer from ovarian cyst or uterine fibroids; the presence of *linea albicantes* has no significance as regards the question of pregnancy. They arise from any distension of the abdomen sufficient to cause rupture of the skin, and hence are found not only in pregnancy, but in ovarian cyst, ascites, and other conditions which are likely to cause abdominal enlargement, and may be entirely absent in women who have borne children.

Palpation is practised by placing the hand over the abdomen, in



cold weather the hands having previously been warmed. The abdominal cavity is carefully explored, the condition of the various organs investigated, and any enlargement of the abdomen, presence of a cyst or tumor, can generally be recognized readily. Palpation is practised by placing the hands now upon opposite sides of the abdomen and then close together, going over one portion after another, so determining the size, consistency, resistance, and regularity of the growths, the presence of outgrowths or nodules, and the sensation of crepitation or of friction. Placing the hand upon one side and striking gently with the other will elicit fluctuation, particularly when we are dealing with a large unilocular cyst. In multilocular growths the fluctuation wave would be shorter or may be entirely absent.

Percussion is of special value in determining the outline or extent of growths, their relation to the abdominal viscera, and their determination from other forms of abdominal distension. It affords an absolute means of differentiation of growths from distensions of the abdomen by free fluid or accumulations of gas.

Auscultation gives but slight information. It is of service in differential diagnosis, more particularly in its negative results.

DIAGNOSIS.—The diagnosis of ovarian tumors may be divided into two divisions: first, the determination of such growths when small and situated in the pelvis; second, when large, filling the greater part of, or the entire, abdominal cavity.

The physical signs vary according to the size and position. In the former stage the tumor is entirely within the pelvis and its position varies. It may retain the normal situation, and as it increases in size may encroach upon the general abdominal cavity. Tumors when as large as a hen's egg, however, generally fall downward and backward into Douglas's pouch immediately behind the uterus. In rare cases they may be found in front or to one side. The ovary, but slightly enlarged, may retain its normal position. Its relation to the corresponding side of the uterus affords but little difficulty in determining its character by conjoined manipulation. Where its growth has been associated with peritonitic inflammation, it may be more difficult to determine its true character. Small tumors are usually firm to the feel, for the reason that they are too small to produce an elastic consistency. In a large tumor situated behind the uterus the diagnosis is determined by the circumscribed character of the growth. Elasticity is a valuable sign, which is gen-



erally absent in proliferating cystomata, and even in single cysts, and particularly dermoids, which afford a solid sensation to the touch. If we are unable to determine or separate the tumor from the uterus, and consequently to determine its pedunculation, this can be ascertained by Hegar's method, which consists in placing the patient upon her back, seizing the uterus by a pair of volsella forceps, and strongly dragging it down; at the same time we endeavor to feel the lateral borders of the uterus as far as the fundus with one or two fingers in the rectum, or we push the uterus downward and backward by means of the outer exploring hand, and thus outline its relations. When the tumor is not too large it can generally be outlined with the finger in the rectum and the hand over the abdomen. The greatest difficulty is experienced in those cases in which the tumor is adherent in the pelvis and surrounded by exudation or is incarcerated. Tumors which are situated entirely within the broad ligament, and formed unilaterally or bilaterally or in close apposition to the uterus, are less spherical and circumscribed, and less movable from the start. Small growths must be diagnosed from fibroids and tumors caused by disease of the tubes, particularly hydro-, pyo-, and hematosalpinx. The more acute history, marked tenderness, evidence of inflammatory exudation, thickening and matting together of the pelvic tissues, and increased pain, would eliminate pyosalpinx. In hydrosalpinx the tumor may be movable, present a sensation of elasticity or fluctuation, but it is oblong or gourd-shaped rather than spherical. It is closely attached to the uterus and presents a history of previous inflammation. Hematosalpinx is at first soft, and then becomes hard and dense from coagulation of the blood. It is situated to one side of the pelvis rather than posterior to the uterus.

*Large or Abdominal Cysts.*—In a woman suffering from a large ovarian cyst the abdomen will be found distended more particularly at its lower part, quite prominent, and rising abruptly from the pubes. As the patient lies upon her back with the abdomen exposed, it will be seen to be sharply and definitely outlined, and generally symmetrically developed; if any difference, a little more prominent on the right side. Palpation may determine its outline, extent, and size. If there is a large single cyst, the surface will be smooth and regular, while in multilocular cysts it may present projections and irregularities. If made up of a number of small cysts, it will present a much more

marked resistance, although there is still a sensation of elasticity. The tumor may be moved from side to side or pushed upward and downward. Percussion discloses dullness over the entire surface of the tumor, with resonance above and possibly resonance in the flank upon one side. The resonance in this region is supposed to indicate that the tumor has developed from the opposite side or ovary, and as it increased in size has pushed the intestines upward and to the unaffected side. We cannot, however, with certainty determine in this way the ovary from which the tumor has arisen, as when the growth has increased in size it is likely to become prolapsed into Douglas's pouch and develop from there; consequently this does not afford a positive indication as to the source of origin.

Considering the conditions with which ovarian cyst may be confounded, it is well to begin with pregnancy, from its greater frequency and importance. It may seem unreasonable that pregnancy should be mistaken for an ovarian cyst; but there are a number of cases upon record in which the abdomen has been opened to find the distention caused by a pregnant uterus. In order to arrive at a correct diagnosis we need to carefully analyze the symptoms of the two conditions. In this we consider the history of the case. In pregnancy the enlargement of the abdomen is more rapid, and is generally attended by suppression of the menstruation, the sympathetic symptoms, nausea, vomiting, disturbed appetite, and a healthy appearance of the individual. Suppression of menstruation is not a constant symptom of pregnancy, as there are women who continue to menstruate during the entire period of pregnancy. It may be associated with ovarian cyst, particularly where both ovaries are completely degenerated. Error is most likely to occur, in early pregnancy, in the unmarried. In these cases the physician should carefully avoid announcing a diagnosis until a careful examination has been made, and even then should not be too hasty. If there is any doubt, he should defer expressing an opinion, and have the patient undergo an examination a few weeks later. The changes which occur will generally be sufficient to enable him to express a definite opinion. In pregnancy there is generally an absence of fluctuation. The same symptom may be absent in ovarian cyst with thick viscid contents, or in the areolar or glandular varieties made up of a large number of small cysts. Later, fetal movements and parts of the fetus may be distinguished, and the fetal heart-sounds

recognized. The latter symptom is one which is pathognomonic of pregnancy. Heart-sounds, however, are not always heard, owing to the position of the fetus and the large quantity of fluid or possible fetal death. Conjoined examination through the vagina or rectum should be a part of the procedure. By it we are enabled to determine the association of the abdominal distension with the increased size of the uterus. Gestation in one horn of a bicornate uterus may render diagnosis difficult. Careful examination by the vagina and rectum will show the association of the enlargement with the uterus, the other cornu possibly remaining small. Where there is the least suspicion of pregnancy the introduction of the uterine sound should absolutely be avoided.

*Hydramnios.*—Cases in which the liquor amnii exceeds two quarts have been mistaken for ovarian tumor. Large accumulations within the walls of the uterus give rise to fluctuation, the abdominal walls will be greatly distended, glistening, and the patient will suffer from all the discomfort arising from a marked abdominal distension from ascites or ovarian cyst. This condition generally comes on suddenly, and takes place about the sixth or seventh month of pregnancy, which prior to its occurrence has run a normal course. On examination the uterus will be found distended, possibly the cervix obliterated, the os open, covered with a dense membrane, and by manipulation we may be able to distinguish the symptom of ballottement; rupture of the membrane results in the discharge of a quantity of water and the emptying of the uterus. The existence of ovarian cyst of one or both ovaries does not necessarily indicate the non-existence of pregnancy, as so long as any ovarian stroma remains unaffected, ovulation and conception may occur. The increased quantity of blood directed to the pelvis during the progress of pregnancy may increase the rapidity of development of an ovarian cyst. The enlargement of the abdomen may be so marked as to indicate the necessity for interference with the process in order to prolong the patient's life. Careful examination will disclose the enlarged uterus either in front of or behind the ovarian cyst. In some cases the ovarian cyst may be situated in the pelvis and obstruct the vagina, rendering it difficult to reach the cervix. In the later months of pregnancy such cysts may be tapped, permitting the completion of gestation, or, if discovered early, ovariectomy may be performed. The occurrence of pregnancy does not seem to influence the mortality of the operation.

Morbid collections within the uterus may be physo-, hydro-, or hematometra. Physometra is a collection of gases within the uterus, the result of decomposition, and is a very rare condition. Hydrometra is a collection of water in the organ which is more likely to take place in women of advanced age, due to the retention of the secretions from obliteration of the canal. Hematometra may result from occlusion of the cervix or vagina, with retention of menstrual discharges. It is more likely to occur near puberty. Examination by vagina or rectum is usually sufficient to demonstrate the cause. Other growths within the uterus which have led to difficulty in diagnosis are myomata or fibro-myomata. These growths are rare before the twenty-fifth year; indeed, not common before the thirtieth. They are more likely to be confounded with ovarian tumors on account of the very great size to which they attain, filling up the entire abdominal cavity and presenting a tumor larger than the pregnant uterus at full term. These growths are usually of slow development and irregular in outline. They are firm and without fluctuation. They may cause no disturbance of the menstrual function, as in the subperitoneal fibroids or marked menorrhagia as in the submucous. Vaginal examination discloses the close association of the tumor with the uterus. Generally movement of the tumor will cause movement of the cervix. Where the tumor is connected with the uterus by a long pedicle, it may be more difficult to determine its character. This may be accomplished by having the tumor, through the abdominal walls, drawn up by an assistant, while the cervix is drawn down by a volsellum in the hand of the examiner, who introduces the finger of the other hand into the rectum, and thus definitely determines the association of the mass with the uterus. If it can entirely be separated from that organ, it is evident the growth is ovarian. Auscultation usually discloses a blowing sound due to the coursing of blood through the large uterine sinuses—a condition which is absent in ovarian cysts. The conditions which are most difficult to determine are those in which a fibroid with long pedicle is œdematous, giving a sensation of elasticity, or an ovarian cyst with thick, viscid contents, or those cases of fibroid growth which have undergone cystic degeneration. The methods we have already mentioned of determining whether the growth is a part of the uterus may be exercised. Cases of doubt may be determined only during the progress of the operation.

*Ascites.*—There is generally little difficulty in arriving at a cor-

rect diagnosis in cases of uncomplicated ovarian cyst. Unilocular ovarian cysts probably more frequently than any others are confounded with ascites. It may be avoided by keeping in mind that in ascites, if the patient lies upon her back, the abdomen is likely to be flattened, broader from side to side—that there is less resistance, and upon palpation the abdominal wall can be depressed to a greater degree, displacing the free fluid. Upon percussion in ascites there is a zone of resonance at the summit of the distension, due to the intestines filled with gas floating to the surface, while there is dullness in the flank and over the sides. In ovarian cyst there is dullness over the surface of the distension, resonance above it and over one flank. In ascites the level of the fluid changes with the change of position, consequently the resonance changes; in ovarian cyst it is unchanged. Very marked abdominal distension may afford an element of uncertainty in the fact that the distension is so great that the mesentery is too short to permit the intestines to come in contact with the abdominal surface. In such cases depressing the abdominal walls, thus displacing the intervening layer of fluid, may afford resonance, while superficial percussion is dull. Entrance of gas from an intestinal communication or decomposition of the cyst-contents may render an ovarian cyst resonant. In these cases we will have to depend upon the resistance of the cyst to determine its presence. In cases of ascites, also, the history will be of advantage, as affording information of renal, cardiac, and hepatic disease. In ascites the wave of fluctuation may be followed around in the flank where it would be absent in a cyst. In inflammatory ascites or ascites from tubercular peritonitis the diagnosis may be difficult, and only determined after incision. Ascites may complicate an ovarian cyst; thus by depression a layer of fluid may be displaced, bringing the hand in contact with the tumor within. The amount of resistance will determine whether the tumor is solid or cystic. The occurrence of ascites complicating a cyst may generally be considered as an indication of malignancy or some degenerative process. The more marked the ascites, the greater the probability of malignancy. The uterus will be found freely movable in ascites, while in ovarian cysts it will be displaced either downward and backward or upward and forward. In ascites from ruptured papillary cysts the uterus presents on either side a dense thickened mass which should cause a suspicion of its true character.

*Phantom Tumor.*—Phantom tumor is a condition in which there



is an apparent tumor due to distention by gas. This may in some cases attain to considerable size, and when associated with the illusion of supposed pregnancy is known as pseudo-cyesis. It is more likely to occur in nervous sterile women. The form just spoken of occurs in cases of illicit intercourse in young individuals in whom there is a fear of pregnancy, or in older women in whom there is a morbid desire to have children. Such patients will experience the fetal movements and all the ordinary sensations of pregnancy. It is likely to occur at or near the climacteric, and is generally associated with a large increase of adipose tissue. Percussion over the abdomen is sufficient to disclose the fact that the apparent tumor is filled with gas. Palpation will generally elicit the absence of any tumor, or, if the swelling or distension remains permanent under pressure, it may be entirely removed by placing the patient under the influence of an anesthetic.

*Uterine Myomata complicating Ovarian Cyst.*—The presence of a cyst of the ovary and a fibroid tumor of the uterus in the same patient is not infrequent. Where the ovarian cyst is large and situated in front of the uterine tumor, the diagnosis may be difficult, and only determined after puncture of the cyst or abdominal section. The author recently made a diagnosis of this condition in a patient with the following history: A woman *æt.* 33 years, married, had been suffering with abdominal enlargement for nearly a year, which for the last four months had increased more rapidly. She had been suffering from irregular hemorrhage; was pale and emaciated; she complained of severe pain over the abdomen, increased by exertion. The abdomen was distended about the size of a six months' pregnancy; upon the right side, a little below the level of the umbilicus, was a hard, firm growth, apparently closely associated with a tumor upon the left side which extended above the umbilicus. The left tumor was more elastic and apparently contained fluid. Moving the mass upon the right caused the cervix to move, while movement of the left tumor apparently had no influence upon it. The diagnosis was, right side, myoma; left side, probably ovarian cyst made up of small cysts. Upon preparation for operation she was found to present a softened, dilated cervix, a bloody discharge, and within the uterus a fetus which gave evidence of having been two weeks dead.

*Obesity.*—A large pendulous abdomen from accumulation of fat within its walls or fat in the omentum may be mistaken for an

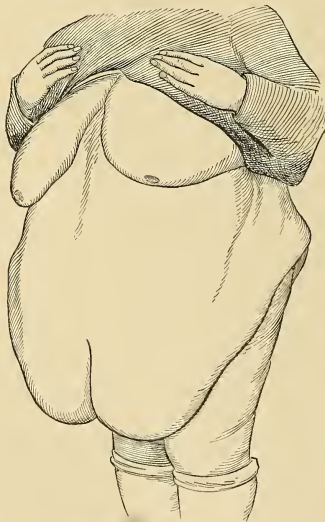


ovarian cyst. The history of development, the general distribution of adipose over other parts of the body, while with ovarian cysts there is loss of adipose or emaciation, aids in the diagnosis. The thickness of the abdominal walls may be estimated by pinching up a fold of the skin and subcutaneous tissue.

*Ventral Hernia.*—In two cases the author has been called to see patients suffering from supposed ovarian cysts, when the condition was due to separation of the recti muscles and protrusion of the intestines covered only by skin and peritoneum. Palpation of the intestinal coils and resonant percussion should have excluded the diagnosis of a cyst.

*Desmoid Tumors.*—These tumors originate in the fascia or deeper

FIG. 320.



Fatty Abdominal Wall, Simulating Ovarian Cyst.

layers of the muscles. They are firm and resisting, are movable within the abdominal walls, above the surface of which they project to a marked degree. Vaginal or rectal examination aids in excluding them from a pelvic origin.

*Tympanitis*.—Abdominal distension, as in phantom tumors, whether local or general, is characterized by resonance. The latter is associated with symptoms of inflammation; the former occurs in nervous, hysterical individuals.

*Fecal Tumors*.—An accumulation of feces is sometimes called a fecal tumor. It generally takes place in the colon. If it occurs in the transverse colon, that organ may be displaced downward by its weight, and rest over the lower part of the abdomen. Such accumulations are sometimes quite extensive. They are distinguished, however, by the length of the tumor, the peculiar sensation to the touch, the fact that it retains the imprint of the finger, and that it is entirely removed by free purgation and copious enemata.

*Distended Bladder*.—An over-distended bladder forms a tumor in the lower part of the abdomen, which fluctuates, is sensitive to pressure, and may be mistaken for a cyst. The precaution should always be taken to empty the bladder as a preliminary step to examination. It will of course thus be eliminated. In cases of pregnancy or fibroid tumor impacted in the pelvis, or even in impacted ovarian cysts, we may have retention resulting, and difficulty in the introduction of a catheter. In such cases it may be necessary to use a soft male catheter.

Cystic tumors, which may be mistaken for those of the ovary, are hydatid cysts of the liver and spleen, and cysts of the omentum, mesentery, pancreas, and kidney. Instead of cysts of the kidney, we may have the entire structure of the organ dilated, giving rise to a hydro- or a pyo-nephrosis. Hepatic cysts or dilatations of the gall-bladder are only mistaken for ovarian cysts when they are very large, filling up the abdominal cavity or by their weight dragging down toward the pelvis. When small they are found situated in the upper part of the abdomen to the right side. The diagnosis is usually determined by the percussion resonance being situated to the opposite side and the lower part of the abdomen, while there is dullness above. On vaginal examination the position of the uterus will be disclosed; possibly also the enlarged ovaries on either side of it may be recognized. In hydatid cyst crepitation elicited by placing the hand over the cyst, and making pressure, will aid in determining its character. This is still further confirmed by finding upon microscopical examination of some of the fluid withdrawn for that purpose, hooklets and spurs of the echinococci. Tumors of the spleen are situated on the left side of the

abdomen, and extend downward toward the pelvis, not infrequently extending across the abdomen. Mesenteric and omental cysts attain a considerable size, and often present great difficulties in diagnosis. Manipulation may, however, disclose the absence of attachment to the pelvic organs, and in this way afford a suspicion of their true character. The mesenteric cysts usually develop behind the peritoneum, and are consequently retro-peritoneal cysts. They may be situated to one side of the abdomen or in the median line, and usually do not dip down into the pelvis. Fluctuation is indistinct, and may be associated with resonance from the overlying intestine. Renal cysts in their origin develop from one side of the abdomen, are usually more or less fixed, and, increasing in size, may be pushed or displaced downward, in some cases occupying the anterior surface of the sacrum. An important aid in the diagnosis of these tumors is their mobility. Retro-peritoneal cysts sometimes develop in the pelvis, filling it up and rising upward into the abdominal cavity. Such tumors will usually be found closely associated with the uterus and difficult to separate from it; the uterus will be lifted up by them, the fundus felt in front of the tumor, above the symphysis; there will be a displacement generally of the rectum more to the left side, or it may run over the anterior surface of the tumor. These tumors are more or less resisting, presenting a sensation of elasticity rather than of fluctuation. They are generally rapid in growth and of a malignant character, more likely to be sarcomatous.

Where our examination satisfies us that we have to deal with an ovarian cyst, it still becomes a question of considerable importance to determine its character, whether single, multilocular, or dermoid. Multilocular cysts are usually of more rapid growth. They present a sensation of greater resistance than the unilocular, with a less distended wave of fluctuation. In the unilocular cyst the wave of fluctuation can be felt distinctly from one side of the abdomen to the other. In the multilocular, as the cyst is divided up into a number of smaller cysts, the wave of fluctuation must necessarily be shorter, and if the cysts are sufficiently small no fluctuation will be distinguished. These cases are sometimes exceedingly difficult to determine from the œdematous fibroid, and it is only by careful manual examination, by which the association of the latter with the uterus is determined, that we are able to

arrive at a diagnosis, and in some cases only an abdominal incision will afford us a correct knowledge.

A case came under observation a year ago in which to the right of the cervix was found a mass, somewhat hard and resisting, which was felt to be continuous with the cervix. Above this was a considerably larger mass, soft and elastic, and between this and what we had supposed to be the entire uterus was tissue into which the fingers could be pressed. This apparently indicated that the tumor had grown from the broad ligament and was closely associated with the uterus. The diagnosis was a probable intra-ligamentary ovarian cyst. Upon opening the abdomen the mass which we had supposed to be an ovarian cyst proved to be an œdematous fibroid. The mass to the right, which was firm, was a second fibroid in a more mature condition, and the soft line between them was the junction of the fibroid with the body of the uterus.

Dermoids are distinguished by their slow growth, greater mobility, sensation of resistance, and absence of fluctuation.

*Adhesions.*—Adhesions may be expected where a tumor has attained a very great size; under the pressure the tumor suffers a loss of the epithelial layer; roughening of its surface follows, with a tendency to a slight peritonitis and the formation of adhesions. These are more likely to take place over the anterior surface of the tumor, and next in frequency between it and the omentum. The history of repeated attacks of peritonitis during the progress of the growth will almost certainly indicate extensive adhesions. They will occur also in inflammatory conditions of the cyst, whether resulting from torsion of its pedicle, from suppuration, or from gangrene. The mobility of the tumor or the ease with which the abdominal walls can be moved over it leads us to hope that adhesions are slight, though we cannot absolutely determine that it is free from them.

*Pedicle.*—Enlargement of the ovary causes it to prolapse and drag upon its attachment to the broad ligament, and thus become more or less pedunculated. This elongation of its neck becomes increased when the tumor is large enough to rest in part upon the brim of the pelvis. The neck or attachment is known as the pedicle. It is composed in most cases of a part of the broad and ovarian ligaments, and generally contains the Fallopian tube. The thickness and length of the pedicle can only be determined with certainty at the time of removal. Where the tumor is freely movable it is rea-

sonable to suppose that we have to deal with a long pedicle. Elevating the tumor with the external hand while a finger of the other is introduced into the vagina, or better into the rectum, the connection of the growth to the uterus can be determined.

*Exploratory Puncture.*—In obscure and complicated cases the diagnosis is so difficult that it has been deemed desirable to determine the character of the tumor and its contents before deciding as to what operative procedure to adopt. To accomplish this, the removal and examination—chemical and microscopical—of a portion of the cyst-contents have been recommended.

It should be remembered that the operation of aspiration of a cyst is not unattended with danger, as the intestines and bladder have been frequently punctured. There may be an escape of fluid into the peritoneal cavity or the entrance of air into the tumor, and the latter may be followed by gangrene or suppuration. A large vessel in the tumor-wall may be injured by the introduction of the aspirator, and an extensive hemorrhage result. In view of these dangers tapping is rarely justifiable.

A proliferating cyst usually furnishes fluid of a thick, colloid character, with a specific gravity of 1015–1030, which contains paralbumen and cylindrical epithelial cells. In the papillary cysts there is an absence of paralbumen, while the microscope discloses white blood-corpuscles. The fluid from the Graafian follicles is not distinguishable from that obtained from parovarian cysts. Ascitic fluid is thin, light yellow or greenish-colored, deposits albumen on boiling, does not contain cylindrical epithelium, and has a specific gravity of 1008–1015. In the cysto-fibromata the fluid has a lemon-yellow color, with a specific gravity of 1020, coagulates rapidly without heat, and does not contain cylindrical epithelium. The fluid from echinococcus cysts is distinguished by the hooklets, and has a specific gravity of 1008–1010, without albumen. In hydronephrosis the fluid is thin, with a specific gravity of 1005–1018, varies in color, and contains urea, leucine, tyrosine, and kreatinine. Puncture in an ovarian cyst is always dangerous, and when performed for diagnosis in doubtful cases, as in echinococcus cysts, renal tumors, abscesses, or dermoids, it may be attended with the most serious consequences. The exploratory incision is a far less dangerous procedure. In cases in which it is impossible to arrive at a correct diagnosis, as in ascites from tubercular peritonitis or malignant disease of the ovary, tube, or omentum, or from papillary



cysts, the buttonhole incision, through which one finger can be introduced, is far the preferable procedure, and, while admitting opportunity for the determination of the condition by touch, affords a subsequent opportunity for drainage.

**TREATMENT.**—As the fluid is contained within a closed sac which has its own secreting surface, the administration of remedies or the use of counter-irritants for the purpose of decreasing the accumulation by increased secretion and elimination is without reason. Electrolysis has been advocated, but when we consider the character of such growths and the danger of infection from many of them, it is too dangerous a plan to be considered. Surgical treatment consists of extirpation. Puncture is at best only a palliative measure, as the removal of the fluid is quickly followed by its re-accumulation, and is attended with great loss of albumen. The first puncture would necessarily be followed by others at shorter intervals, until the patient becomes exhausted by the severe drain. As has already been mentioned, it is attended with danger from the direct loss of blood, as the opening of a vessel, presence of papillary cysts, and rupture of a thin-walled cyst and the spreading of its papillary contents to the peritoneal cavity, as well as from septic infection. The operation may be done in pregnancy in the later stages in preference to ovariectomy as a temporary expedient, where the cyst is situated in the pelvis and would interfere with the delivery of the patient. Under these conditions the puncture should be made through the vagina.

This is an exceedingly dangerous procedure, however, as the vaginal canal is difficult to render thoroughly aseptic. Puncturing the cyst through the rectum is under all circumstances absolutely unjustifiable.

**OVARIOTOMY.**—The only treatment that is applicable to all cases and is worthy of consideration is the extirpation of the tumor, or ovariectomy. Success in the performance of this operation will depend very much upon the care with which the diagnosis has been made, the knowledge of the operator concerning the condition of the patient, the dexterity with which the operation is performed, or the readiness in meeting complications, and the judicious treatment of patients subsequent to its performance.

*Operation.*—In considering the conduct of the operation we prefer to divide it into different steps or stages and describe the method of procedure in each. By so doing we feel that we can impress



upon the would-be operator a graphic outline of the various accidents which may occur and the subterfuges to which he may be obliged to resort as he proceeds. We do not feel that he can deviate from a safe course in completing the entire journey if an accurate chart of each portion is presented. The different steps are:

1. Incision of the abdominal wall;
2. Puncture, emptying, and removal of the cyst;
3. Management of adhesions;
4. Management of the pedicle;
5. Toilet of the peritoneum;
6. Drainage.

A description of the abdominal incision will be found in the chapter on Technique.

Incision of the peritoneum should be made between two dissecting forceps, which hold it away from the abdominal contents and avoid danger of injuring the cyst or coils of intestine. The peritoneum incised, the pearly, glistening surface of the cyst is exposed; when there are adhesions the finger should be introduced as a guide to guard against injury to the cyst or to intestine. At the lower part of the wound it will recognize the bladder and prevent it being wounded. The peritoneum may be overlooked and cut through, and the omentum mistaken for preperitoneal fat; in the latter the vessels are transverse, in the former vertical. Where the peritoneum is firmly fastened to the parietes of the cyst it may be difficult to determine when it is reached. The cyst-wall should be incised, the cyst emptied, and an attempt made to withdraw the posterior wall; or the abdominal incision may be continued to the umbilicus, where the layers of the wall are fused together, when the cyst-wall will be more easily recognized. As a preliminary step to further procedure after the peritoneum is incised, it may be fastened to the integument by one suture about the middle of either side of the wound. This procedure prevents its being pushed off from the abdominal walls during the further manipulation.

*Emptying the Cyst.*—The cyst projects into the wound, presenting a pearly, glistening appearance. The trocar, with a rubber tube attached long enough to dip into a receptacle placed beneath the table, is plunged into the cyst, choosing a point for its introduction which will empty the large or main cyst and is free from large vessels. This puncture should not be made at the lower angle of the wound, for the reason that as the cyst empties it retracts and leaves the

opening situated below the wound, increasing the difficulty of preventing the fluid from flowing into the abdomen. As the trocar is plunged into the cyst the abdominal walls are held close about it, and sponges should be packed around the orifice to prevent any fluid running back into the peritoneal cavity. As the sac becomes relaxed it is grasped with hemostats, and later with cyst-forceps, and drawn out, keeping the opening in the cyst outside the abdominal wound. The assistant will place his hands upon either side of the abdomen or upon its upper part, making pressure which forces out the fluid and keeps the wound stretched over the projecting surface of the cyst. If there are a number of cysts, the trocar may be passed from one into the other. In this procedure, however, it is important that the hand should be passed into the abdomen around the cyst to prevent the trocar from perforating its main wall, injuring the viscera or abdominal tissues, or permitting the escape of fluid. Where a trocar of suitable character is not at hand, the parts may be drawn tense around the cyst, puncture made into it with a knife, the edges grasped with forceps, drawn out, and the orifice thus kept outside the abdominal cavity. Other cysts may be opened through the first cyst, and their cavities broken down by the hand passed through the opening. This, in some cases, may be necessary, owing to the consistency of the fluid being such that it will not readily flow through the trocar. In small cysts it is preferable to introduce the hand and break up the cysts rather than to attempt to pass the trocar in different directions to empty them. As the cyst is emptied it is also drawn out, so that in a single cyst, or in a multilocular cyst which is not adherent, the emptying is followed or partially preceded by the withdrawal of the sac. Where the cyst has thick, viscid contents, it may be necessary to draw it well up into the wound before opening it, or possibly, after turning the patient upon her side, to press back the abdominal wall from the under side, open the cyst, and, dragging the opening still farther out, break up the contents. In this way a cyst of considerable size may be brought through a small opening. Where there is considerable solid material in the cyst, however, requiring some difficulty to bring it through the opening, the latter should be enlarged, rather than to subject the patient to much manipulation in order to avoid a large opening. In dermoid cysts or those in which suppuration has occurred it is better that a larger opening should be made and the cysts be removed entire. When the contents of dermoid cysts

flow into the abdominal cavity it is exceedingly difficult to remove them and to neutralize their irritating effect. The material is oily in character, and does not wash out readily by irrigation; for such reasons it is preferable that the cyst should be removed intact.

*Adhesions.*—The ease with which adhesions may be managed depends much upon their character. In recent cases, where the cyst has undergone inflammatory action, resulting in adhesive peritonitis, the adhesions may readily be overcome by the use of the sponge. It is sometimes recommended to introduce the hand into the abdominal cavity before the cyst is punctured and separate or break up the adhesions. This can readily be done over the anterior parietes, where the adhesions are soft, but dense, firm adhesions should preferably be separated at the wound under the guidance of the eye. Consequently, after the cyst has been wholly or partially emptied, it is drawn out, and where adhesions of a soft and friable character exist, these are separated by pressing the viscera off from the sac by a sponge. Adhesions will depend in gravity upon their situation and duration. The older the adhesions, the more thoroughly organized they become and the more difficult they are to separate, requiring, in some cases, the use of the scissors or knife. Parietal adhesions, where they cannot be sponged off, may be separated by the finger, tearing the surfaces from the cyst-wall, or, where this cannot be accomplished, by using the scissors. Not infrequently considerable bleeding will take place. Omental adhesions are frequently long and quite vascular, so that they are preferably tied with a double ligature and cut between, using for this purpose fine silk. Adhesions that are difficult to manage are those between the intestine and other abdominal viscera and the cyst-wall. Such adhesions may involve coils of the intestine, the stomach, the spleen, the liver, and the gall-bladder. Adhesions to some of these organs are exceedingly firm and only separated with considerable difficulty. Where the adhesions are long they may be separated by means of the scissors or by grasping the adhesions with a clamp and burning through the tissues with the cautery. When the adhesions to the intestine, for instance, are sessile, the removal of the neoplasm may be attended with considerable difficulty. In some cases adhesions are very close, and their removal would involve the structure of the bowel, impairing its vitality. It is then preferable that the cyst-wall should be cut through, leaving a portion of it attached to the intestine, taking the precaution

to remove the epithelial lining membrane, thus taking away the entire secreting surface of the cyst. Pelvic adhesions of long duration are the most difficult to manage and the most dangerous in character. A tumor which has been situated low down in the pelvis, filling it, may be adherent to the large arterial or venous vessels. The author never had a more trying or sadder experience than in a woman of sixty-three years of age, the mother of a physician, who had a thin-walled cyst, which was completely emptied, and was only adherent in the pelvis. On making gentle traction upon the cyst, endeavoring to push off the pelvic tissues, there was at once a sudden filling up of the entire pelvis with venous blood, showing that a large vein had been injured. The hemorrhage was controlled by packing the pelvis with sponges, removing the blood, but the patient was already profoundly shocked. After the removal of the sponges the pelvis was packed with iodoform gauze, which was brought out at the lower angle of the wound. She lived but a few hours after the completion of the operation.

In some cases the adhesions will be found extending into Douglas's cul-de-sac, requiring an universal enucleation. In parovarian or broad-ligament cysts we may find the broad ligament spread out and covering the cyst-wall. In such cases it is important to examine carefully the tissues as we progress, for the tumor may be found to have begun its development deep in the broad ligament, and may have pushed above it the ureter, as was found by the author in one case of broad-ligament cyst: after opening the cyst and commencing to enucleate, the ureter was found to pass directly over it. Attempted enucleation would have been attended with so much injury to the ureter as to have imperilled its vitality. For this reason the tumor was completely emptied, irrigated and with a view of securing drainage, stitched to the abdominal wound and its cavity packed with iodoform gauze, in order to set up inflammatory changes within it to destroy its secreting surface and lead to adhesion of its walls. In this, however, we regret to say, the operation was not a success, as the patient appeared a few months later having a cyst fully as large as the one for which we had operated.

Papillary cysts may develop beneath the broad ligament, and infiltrate the tissues to such a degree as would render their removal almost impossible, or, if removal were performed, would leave a large, ragged, raw surface which necessarily increases the danger to the patient. In bleeding following the separation of extensive adhe-

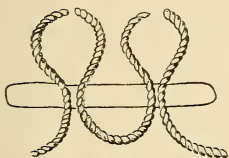
sions, not arrested by irrigation with hot water, it may be necessary to use the Paquelin cautery. Where the adhesions have been to the anterior parietes in very large cysts, large raw surfaces are exposed; that is, the peritoneum is torn through. The bleeding may be controlled and unfortunate intestinal adhesions avoided by introducing sutures through the abdominal wall in such a way as to approximate the large raw surfaces and thus shut them out of the abdominal cavity and promote their union.

*Pedicle.*—After emptying and drawing out the cyst, the empty sac is found to be attached to the abdominal cavity by a more or less narrow band of tissue which is known as the pedicle. It consists in the majority of cases of the ovarian ligament, a part of the broad ligament, with not infrequently the tube extending over the cyst. There has been much discussion in the past upon the proper treatment of the pedicle—whether it should be treated intra- or extra-peritoneally; in other words, whether it should be ligated or the vessels otherwise secured and dropped back, or should be brought out and fastened in the lower angle of the wound. In the latter method of treatment it has been the custom to use the clamp. This clamp method for many years was practised by Atlee, Wells, and contemporary operators. Its advantage was the security against hemorrhage and the fact that the pedicle was constantly under observation. It had the disadvantage of requiring a longer time for convalescence; the pedicle sloughed off, increasing the danger of septic infection, leaving a surface to heal by granulation, and in some cases has resulted in subsequent menstruation from the stump. The intra-peritoneal method is that which is now universally practised. The pedicle may be ligated, or cauterized as has been recommended by Keith. Cauterization is performed by grasping the tissue of the pedicle in a clamp, one side of which is covered with ivory plates to prevent the heat being conveyed to the tissues beneath, and searing the included tissues by cautery-iron heated to redness. The method is not to be used under any circumstances where it is possible to place a ligature. Operators universally prefer the use of the ligature. The pedicle, when of ordinary size, is transfixed and tied in two portions. The ligament should be transfixed with a double ligature, cut, and each half tied separately and then both the ends together, or one ligature may be carried around, tying it over both parts. Where we have a large tumor made up of solid



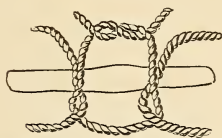
material, which it would require considerable effort to hold and prevent traction upon the pedicle, the latter may be seized with pedicle forceps immediately beneath the cyst, to secure the patient from loss of blood, and the tumor cut away, after which the pedicle may be tied in the manner we have already described. In removing the tumor it is important to leave a sufficiently long stump above the ligature to prevent the possibility of a portion of the tissue being retracted, permitting hemorrhage to take place from either the ovarian or uterine arteries. For ligation of the pedicle either silk or catgut may be used. The catgut is preferred by some operators for the reason that it, being an animal ligature, is absorbable and will not remain to give rise to irritation subsequently. Its disadvantages are that the ligature may slip, affording an opportunity for hemorrhage to occur after the wound has been closed, and the catgut being septic may cause infection of the peritoneal cavity.

FIG. 321.



Triple Interlocking Ligature; the threads inserted.

FIG. 322.



Triple Interlocking Ligature; the threads interlocked ready for tying.

Where the pedicle is a broad one and a short stump is left above the ligature, it is preferable to introduce a second one about that portion of the pedicle through which the ovarian artery passes,

FIG. 323.



Triple Interlocking Ligature tied.

so that in case the ligature should slip this large vessel would still be controlled. An illustration of this procedure is given in Fig. 279. A broad, fleshy pedicle should preferably be tied in a number of sections, the ligatures being introduced and tied as seen in the accompanying figures. Or, better still, an en masse ligature may be placed about the uterine end of the ovarian artery, a second one



about the opposite end of the same artery placed close to the pelvic wall and introduced deep enough to include the round ligament and its accompanying artery. The pedicle is cut away. Any space in the broad ligament intervening between the two ligatures is then whipped together by a continuous catgut suture. After the removal of a cyst and ligation of the pedicle the operator should examine the condition of the other ovary, and should it show signs of cyst-growth, it is also to be removed. In some tumors, particularly the broad-ligament and parovarian cysts, no pedicle will be found. These tumors dip into the broad ligament alongside of the uterus. In such cases it will be necessary to peel out the cyst, and ligate any vessels that may be found to bleed, or, if the bleeding be from a large surface rather than from distended vessels, it may be controlled by gauze packing. This may be accomplished at times without removing the ovary or tube.

*Peritoneal Toilet.*—Where a simple uncomplicated cyst has been removed the necessary toilet of the peritoneum is slight. It consists in sponging out the pelvic cavity or in introducing a sponge to ascertain that there is no sign of bleeding, when the cavity may be closed. Where adhesions have been extensive, it is important to examine carefully to see whether or not bleeding still continues, and, if so, to take measures to control the hemorrhage. If the omentum has been torn from the cyst and shows signs of bleeding, it should be placed upon a towel wrung out of hot water, carefully examined, and bleeding points ligated with catgut. All bands of adhesion or openings in the omentum should be tied and cut away, as they only afford an opportunity for a knuckle of intestine to slip through and thus endanger the patient from obstruction of the bowel in the subsequent convalescence. Where there has been much bleeding and the abdominal cavity has been soiled with discharges from multilocular or papillary cysts, it should be thoroughly irrigated. The preferable fluid for this purpose is a 0.6 per cent. solution of common salt, of which, if necessary, several gallons may be used. The solution is made by adding forty-eight grains of salt to the pint of water, and should always be rendered sterile by boiling prior to use. After irrigation the superfluous fluid may be removed by sponging, or if the drainage-tube is used it may be left. A flat sponge is placed beneath the wound, over the intestines, in such a way as to cover them and keep them back while the sutures are introduced.

*Drainage.*—Before closing the wound we must consider the sub-

ject of drainage. When shall drainage be used? If used, what shall be its character? What shall be the method by which it will be accomplished? The question of drainage is one which has been much discussed of late years, some operators advocating that every case should be drained, others none. Larger experience has demonstrated that drainage may be most frequently omitted. Even in those cases in which the peritoneal cavity has been soiled by discharge from suppurating cysts, the sponging away, and in case any be left the dilution of the poison, usually renders it inert or gives the peritoneum ample opportunity to destroy and absorb it. Irrigation with large quantities of salt solution and closing the cavity with a large quantity remaining is a proper method of procedure. Cases in which injuries of the intestine have occurred of such a character as to render leakage possible should be drained.

As to the form of drainage: a glass tube, as illustrated in the consideration of Technique, is by many preferred. The perforations at the bottom of the tube should be perfectly smooth, depressed rather than elevated, and small, to prevent the entrance of the intestinal walls by intra-abdominal pressure, rendering the removal of the tube difficult and painful, and increasing the danger of lighting up inflammation. The objection to the glass tube is that it requires frequent emptying, and is an open avenue for the entrance of pathogenic germs into the peritoneal cavity. Another method of drainage is the gauze drain, which is also described under Technique. Its advantages are that the possibility of entrance of septic infection is lessened. When the drain is removed, which may be at the end of twenty-four to seventy-two hours, it may be replaced by a sterilized rubber tube. The abdominal wound is closed as described in the chapter on Technique.

The method of managing patients after ovariectomy will be found described in the chapter on After-treatment.

**ACCIDENTS DURING THE OPERATION.**—*Stripping off the Parietal Peritoneum.*—This accident is not likely to occur where care is observed. The operator may overlook the peritoneum, and, supposing that it has been opened, push it off from the abdominal walls. This is especially so in chronic accumulations of free fluids in the peritoneal cavity accompanied by thickening of the parietal peritoneum as in tubercular peritonitis. More frequently, however, it is likely to be opened without being recognized, and the omentum be-

neath regarded as the preperitoneal fat. As has already been observed, this may be avoided by noticing that the vessels in the transversalis fascia run transversely, while those in the omentum are vertical. When the omentum is fastened over the tumor, it is better to find its point of attachment and tear it up, rather than to open through the omentum itself, on account of the probability of bleeding. The peritoneum may be stripped off during manipulation, as in the introduction of sponges to keep the surfaces dry during the introduction of the sutures.

*Rupture of the Cyst.*—In delivering the cyst, particularly where the walls are fragile, it may be torn through, permitting the contents to escape into the abdominal cavity. This is not an accident of serious importance unless the contents of the cyst are putrid in character, as in suppurating cysts, or, again, in the dermoid varieties, where the oleaginous material is exceedingly difficult to remove from the cavity. Tearing of the wall of the cyst during its removal necessitates a thorough irrigation of the abdominal cavity to neutralize or remove the contents.

*Fatal Hemorrhage.*—Fatal hemorrhage during operation was formerly an event of greater frequency than it has been of late. The site of the hemorrhage will have much to do with its character: in large cysts with extensive adhesions we may have hemorrhage taking place from the cyst itself or from vessels that may be torn within its walls, giving rise to a serious condition. In such cases the course of treatment should be to separate adhesions rapidly, lift out the cyst, secure its pedicle, and so cut off the supply of blood. In separating adhesions the larger and more vascular should be cut between two ligatures or between a ligature and a pair of hemostats. If the hemorrhage is of a serious character, the assistant may place his hand within the abdomen and compress the abdominal aorta, maintaining the pressure until after the operation is completed. Such a procedure prevents further supply of blood being sent to the tumor, and so arrests the bleeding. We may find hemorrhage take place from a very extensive surface, particularly after the removal of malignant disease, or extensive papillary growths behind the uterus, involving its entire posterior surface and the pelvic viscera. In a recent case the diseased tissues were hurriedly removed, and the cavity and bleeding surfaces above were compressed by a number of antiseptic towels packed into the abdominal cavity. This thoroughly controlled the flow, but the patient

was so enfeebled prior to the operation, and still further exhausted by the loss of blood, that she died shortly afterward. Fatal syncope and death may take place in very large tumors from the decreased abdominal pressure. Vessels relieved from pressure become distended by the blood, forming reservoirs, until so much is withdrawn from the circulation that the resulting cerebral anemia is sufficient to cause the death of the patient. In such cases the patient may be said to have bled into her own vessels. Such an occurrence is only likely to take place in very large tumors, and may be obviated by emptying the cyst slowly. When syncope occurs the head should be lowered, the limbs wrapped in warm blankets or bandaged, and an assistant may compress the aorta directly with the hand in the abdominal cavity, while the treatment of the pedicle and the toilet proceeds. It may at times become necessary to remove the uterus on account of the free bleeding from its torn and denuded surface. Such a procedure will not infrequently spare the patient the dangers incident to drainage.

*Visceral Injuries.*—Injuries to the viscera, particularly the intestines, are likely to occur during complicated operations. It is important before opening the peritoneum to lift it up with forceps, and make a small incision into which the finger can be introduced. The importance of doing this under the eye can be appreciated when we remember that a coil of intestine may be situated between the tumor or cyst and the abdominal parietes, adherent to the latter, when an incision blindly made might result in cutting into or through the intestine. Where adhesions are dense the intestine may be torn into or even across during the progress of the operation. Where such lesions occur the parts should carefully be repaired at once, and measures exercised to prevent soiling of the peritoneal cavity with the contents of the bowel. The intestine should be carefully sutured, and, when torn through to such a degree as to render the vitality of the parts uncertain, its resection and an end-to-end or lateral anastomosis should be practised. Where the operator is prepared with the Murphy button an end-to-end anastomosis is very quickly accomplished. In the absence of these buttons, an end-to-end anastomosis may be done by simple suturing of the surfaces, beginning with sutures between the muscular surfaces, and then a second row around the peritoneum, so that considerable peritoneal surface is opposed. The most difficult cases to suture are those in which the rectum has been torn during

the operation. Portions of the bowel may be so devitalized that they subsequently slough, giving rise to fecal fistula. In tumors situated low in the pelvis, those that have developed in the broad ligament, and particularly in the papillary forms of ovarian growth, it is quite important to keep in mind the position and relation of the ureter, as this organ may be pulled up or torn off in the enucleation of such masses. Where the situation of the ureter is such as to render its injury possible, it is better to dissect it out to make sure it is uninjured; where it has been cut or torn, the preferable procedure is to establish an anastomosis with the bladder. Where the ureter is short and likely to be too much drawn upon, the bladder should be anchored to the side of the pelvis in the most favorable position to relieve the tension on the ureter. If the bladder and ureter cannot be safely approximated, an end-to-end anastomosis of the severed ureter should be made. (See chapter on Diseases of Bladder, Urethra, and Ureters.) A case has been referred to which came under the observation of the writer in which the ureter passed directly over the upper surface of a large cyst, and came very near being cut or torn in two during the effort at its enucleation. The bladder may be situated in such a position that it may be injured during the abdominal incision or during the progress of the operation. Thus, where the bladder is drawn up by contact with the cyst and spread out over its anterior surface, it may be overlooked before its true character is suspected. The entire fundus of the bladder has been cut away in the removal of cysts. It has been the misfortune of the operator to open into the bladder before he realized its true character. The peculiar interlaced muscular structure of its wall should cause it to be recognized. Wherever the bladder is opened or injured it should be sutured. In a case in which the entire summit of the bladder was cut away the walls were sutured, opposing a good extent of the peritoneal surfaces and the patient recovered. In such injuries it is important also to prevent the bladder becoming unduly distended during the convalescence, especially for the first few days. It should be emptied frequently, in order that the accumulation may not lead to separation of the weak union and consequent leakage of urine.

*Incomplete Operations.*—We are unable by our most accurate rules of examination always to arrive at a correct and definite diagnosis of either the disease or the structures involved.

An incision of the abdomen may reveal that a tumor is so situ-



ated or so extensively adherent to surrounding structures as to render its removal impossible. Incomplete operations were formerly much more frequent than at present. Indeed, there are few cases in which an operation for the removal of a tumor should be discontinued after it has been once begun. In those cases, however, in which an exploratory incision discloses that the disease is malignant, and has already infiltrated tissues which cannot be safely removed, or secondary nodules are found in tissues remote from its origin, the acquisition of such knowledge should be considered a bar to further procedure. If upon opening the abdomen it is found that the entire peritoneal cavity is studded with papillary growths resulting from infection of the peritoneum through the rupture of a papillary cyst, it would be unwise to subject such a patient to the danger incident upon the removal of the original source of the disease.

The cases in which complications too grave to permit of the completion of the operation exist may be subjected to mere closure of the wound where the parts have not been much disturbed; in others it may be necessary to drain: this may be done by a glass or rubber tube or by the gauze drain. Where a cyst has been opened, or in any case in which it has been injured, but is found connected with other tissues by adhesions so firm as to render removal impracticable or unwise, the cyst may be opened, emptied of its contents, brought up and stitched into the abdominal wound. The superfluous portion should be cut away. The cavity may be packed with iodoform gauze, which promotes drainage, and by its presence in the sac may lead to an inflammation which will cause its obliteration.

**SEQUELÆ.**—The subsequent progress of a patient who has been subjected to ovariectomy will depend much upon the manner in which the operation has been conducted. In spite of every precaution that may be taken, there will be some cases of delayed convalescence, possibly due to some latent or pre-existing pathological tendency; but when an operation is carelessly performed and its details are imperfectly carried out, the probability of serious trouble can be appreciated. The operator and his assistants should have so trained themselves that the slightest deviation from a proper course cannot go unnoticed. Of what avail is it to spend much time in securing cleanliness of person, room, and instruments, and then drag the ligature with which the pedicle is to be secured over blankets or dirty tables before its introduction; to dust the wound



with iodoform from a box that has been standing open and used in all sorts of cases about a ward; to rub the nose, scratch the head, or touch other non-sterilized objects, and place the hand in the cavity without any precautionary cleansing? Such indiscretions will often explain stitch-abscesses and other septic processes. Pus-collections and cellular inflammations will occur in the pelvis about and posterior to the uterus, due possibly to some infection of serous collections in Douglas's pouch. Elevation of temperature, rapid pulse, and pain continued after the fourth or fifth day should lead to a careful examination for its origin. A mass of exudation in the pelvis should be considered an indication for the administration of salines in free doses until purgation, and the use of rectal and vaginal enemata of hot water at least twice daily. The exudation should be carefully watched, and the appearance of softening, felt either through vagina or rectum, should be considered as requiring prompt evacuation. The latter is accomplished by an opening through the vault of the vagina behind the uterus. The vagina should have been carefully disinfected, and the pus-cavity should be irrigated with normal salt solution or sterilized water and packed with iodoform gauze.

*Intestinal Complications.*—After operations for conditions complicated by inflammatory troubles intestinal sequelæ are not infrequent. It is difficult to make sure the intestines are free from twists when replaced, but danger is aggravated when we have bands of inflammatory adhesions, or openings in the omentum or mesentery, beneath or through which a knuckle of intestine may slip and become strangulated. Laceration of the coats of the intestine will affect its peristaltic action, and may lead to paralysis of a section, with ensuing symptoms of obstruction. A twist or volvulus may become so fixed that nothing can pass through it. If the walls are already weakened, a fecal fistula may ensue, as has occurred in our experience during the past year. A woman, much prostrated by puerperal sepsis, was subjected to abdominal section, the pus evacuated, forming as it did reservoirs in front and behind the uterus, and the abdomen was irrigated and drained. She did well for a few days, when a discharge of feces occurred, and upon her death some weeks later a volvulus was found. In a case operated upon at the Philadelphia Hospital by a colleague obstruction occurred five weeks after operation. The patient was seized with stercoraceous vomiting. A resection was performed, and five feet of intestine torn up, finding at its base a

distinct volvulus, which was untwisted. The patient recovered after a prolonged convalescence. The importance of early reopening the abdomen in such cases cannot be over-estimated, as the obstruction may be due to strangulation of a knuckle of intestine beneath inflammatory bands or to its enclosure between the sutures in the wound.

*Adhesions.*—It is quite probable that no case subjected to abdominal section is subsequently free from adhesions, though their frequency and extent will depend somewhat upon the presence of sepsis. The more aseptic the operation and the less the peritoneum is injured, the slighter and more fragile will be the adhesions.

They are more likely to take place between the abdominal incision and the underlying viscera, and between the stump of the pedicle and adjoining coils of intestines. The former may be rendered less annoying by drawing down the omentum to protect the wound, and the stumps may be turned forward and stitched to the anterior fold of the broad ligament. Dusting a film of aristol over the intestines to prevent adhesions has been recommended, but the procedure is of little practical use. Where adhesions have formed pain may be caused by traction upon them during the peristaltic action of the intestines. Pain thus caused has been so great that patients have submitted themselves to subsequent operation for relief. It is questionable how much is gained by such attempts, as whenever adhesions are broken up new injuries are produced, which increase the danger of inflammation and additional adhesions.

In all secondary operations the possibility of adhesion to the cicatrix should be kept in mind, and the incision should be prolonged upward to obviate the danger of injuring the intestine.

## DISEASES OF THE URETHRA, BLADDER, AND URETERS.

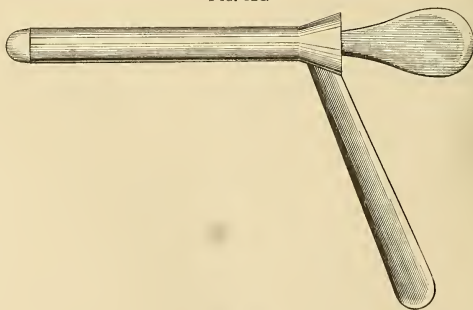
### METHODS OF EXAMINATION.

*Inspection.*—Without using instruments the only portion of the urethra which can be examined is the meatus urinarius externus and a small portion of the canal which lies immediately above it. We here note the shape of the orifice, whether intact or everted, its color, the presence of tumors or ulcerated areas or of a purulent discharge. The lips are then drawn apart and the orifices of “Skene’s glands,” which open just within the meatus, are examined for any evidences of inflammation.

While no portion of the bladder or ureters can be inspected directly without the use of instruments of some sort, the lower abdominal zone may show a rounded tumor or prominence above the symphysis pubes where the bladder is dilated or hypertrophied.

By the use of instruments we obtain the most reliable results in studying the diseases of the urethra, bladder, and ureters. The essential features of the examination are—(1) atmospheric distention

FIG. 324.



Cystoscope.

of the bladder secured by position, (2) the introduction of a simple straight open speculum, and (3) the inspection of the mucous sur-

faces of the bladder, urethra, and ureteral orifices by means of a light reflected into the bladder.

### INSTRUMENTS.

The necessary instruments for such an examination are—(1) a set of Kelly's cystoscopes, (2) a conical dilator, (3) a suction apparatus, (4) a pair of delicate mouse-tooth forceps with long shanks, (5) a searcher, (6) applicators, (7) ureteral and renal catheters, and (8) a reflecting mirror and a good light.

The cystoscopes are nickel-plated cylinders, 8 centimeters long and equal in diameter from end to end. These cystoscopes are made of varying diameter, and a complete set will contain cystoscopes increasing in size from a small one measuring 6 to a large size

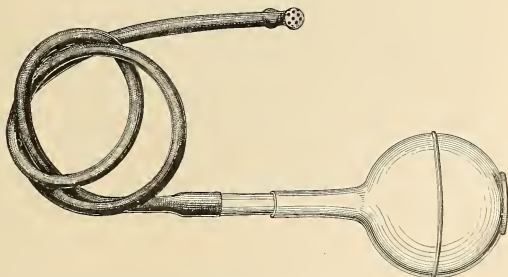
FIG. 325.



Conical Dilator: short lines indicate the diameter in millimeters.

measuring 12 or 14 millimeters, and it will be found convenient, if much work is to be done, to have cystoscopes measuring

FIG. 326.



Suction Apparatus.

respectively,  $8\frac{1}{2}$ ,  $9\frac{1}{2}$ , and  $10\frac{1}{2}$ , millimeters, these intermediate sizes often being useful.

The applicators are instruments shaped like the searcher, but roughened on the end to allow of their being wrapped with cotton.

The light is a most important adjunct, and its intelligent use will

go far toward making the examination successful. An electric drop-light with an oval tin reflector painted white is the best to work with, as it can be more easily managed and held close to the body,

FIG. 327.

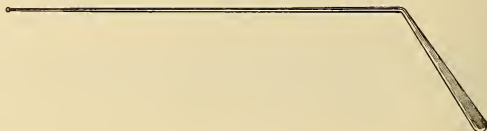


Delicate Mouse-toothed Forceps.

and the light is steadier. If, however, this is not obtainable, a gas or oil lamp can be used with good results.

The reflecting mirrors are like those used by the laryngologists, and should be about three inches in diameter.

FIG. 328.



Ureteral Searcher.

For the examination of the ureters long flexible catheters are used; these are made of braided silk, coated with varnish and rubbed

FIG. 329.



End of long flexible Ureteral or renal Catheter.

perfectly smooth. They are made in two lengths, the short ones, 30 centimeters long, being spoken of as ureteral catheters, the long ones, 50 centimeters, being the renal catheters. The diameter varies from  $1\frac{3}{4}$  to 3 millimeters, and they are numbered according to the measured diameter.

Metal ureteral catheters are also used to catheterize the lower

FIG. 330.



Metal Ureteral Catheter.

portion of the ureter, and those of larger caliber can be employed as dilators for strictures in the lower portion of the ureter.

## THE PREVIOUS PREPARATION OF THE PATIENT.

The patient should have had the bowels well moved before any examination is attempted. The clothes around the waist must be loosened or removed, and the corset should always be taken off. The urine must be passed immediately before she is placed in position on the table, and the bladder is more apt to be completely emptied if the urine is voided standing or if a catheter is used and the bladder is squeezed out bimanually.

The room where the examination is to take place is so arranged

FIG. 331.



The patient in the knee-breast position with the cystoscope in the bladder. The small dilator marks the position of the rectum.

that it may be darkened at will, the examining table being either a plain wooden table covered with a thin mattress or a regular office table.

The instruments are placed on another table near the examiner's hand.

The knee-breast position is the most useful one in the majority of cases. The buttocks and legs of the patient are covered with a



sheet, in which there is either a long slit or a square opening to prevent unnecessary exposure. The labia are gently separated, and the genitals, especially the meatus, are carefully washed with a boracic solution, and then an applicator wrapped with cotton and moistened with a 10 per cent. solution of cocaine is introduced a few moments into the urethra; or in place of the applicator a small pledget of cotton moistened with the same solution may be laid against the urethral orifice. This is allowed to remain in place four

FIG. 332.



Searching for the ureteral orifice with the patient in the dorsal position.

or five minutes, then removed, and the patient is ready for examination.

The use of an anesthetic is usually not necessary, though where this is the first examination, especially with nervous patients, anesthesia will be of great assistance.

The patient may be also examined in the dorsal position, the hips raised six or eight inches above the table, bags filled tightly with bran being placed under the buttocks. In thin women this position is more practicable, but with a large, stout woman it will often be found impossible to get the bladder well dilated, and in any case the examination is much more difficult than with the patient in the knee-breast position.

## THE INTRODUCTION OF THE CYSTOSCOPE AND EXAMINATION OF THE BLADDER AND URETHRA.

The patient being in position and ready, the examiner separates the labia, and, first measuring the size of the urethra with the conical dilator, determines which cystoscope can be most easily introduced. The cystoscope is then grasped, the handle being held in the fingers, the thumb pressing steadily against the handle of the obturator, holding it in position and preventing it from sliding back when the cystoscope is introduced; the end is lubricated with boro-glycerin solution, and it is ready for introduction.

With the patient in the knee-breast position the general direction of the urethra is nearly directly horizontal; and this is the direction in which the cystoscope is held and introduced, a gentle curve being described around the under surface of the symphysis. It should after passing the meatus glide easily and with but little resistance. A mistake which is almost always made at first is the attempt to use cystoscopes of large diameter, these hardly ever being introduced without exerting much force and hurting the patient greatly; therefore, if the cystoscope which was at first tried will not pass easily, a smaller one should be used.

If it be necessary, the urethra may be safely dilated to a diameter of 14 or 15 mm., the only bad result being slight laceration of the external meatus, incontinence never resulting where no greater dilatation than this is attempted.

The dilatation is best carried out by using the graduated Hegar's dilators or the conical dilator before described. Anesthesia will almost always be found necessary in these cases.

As soon as the cystoscope is introduced the obturator is withdrawn, and the air rushes into the bladder, and distends it with an audible suction sound. The light is held by an assistant in such a manner as to make the angle of reflection the smallest possible, and the mirror is manœuvred so as to keep the pencil of light constantly thrown into the bladder during the examination. The first point viewed when the obturator is removed, if the bladder is well dilated with air, is the posterior wall.

It is best to always have a routine system to follow in bladder examinations, and there must be some landmarks to allow of description and for reference in future examinations or treatment. These landmarks may be divided into (1) artificial, (2) natural.

*Artificial.*—The two points, the internal urethral orifice and that part of the posterior wall opposite to it, may be referred to as the anterior and posterior poles of the bladder; and with these as centers the bladder-walls may be divided into an anterior and posterior hemisphere and quadrants by imaginary lines bisecting the two poles; we can thus speak of changes occurring, for instance, in the upper posterior left quadrant, and at the next examination will be able to locate again the same area by reference to our imaginary lines.

Another method, which although not so definite is simpler, is to divide the bladder into the vault, the anterior, the posterior, and two lateral walls, and the base.

*Natural Landmarks.*—These are the internal urethral orifice, the ureteral eminences, the two ureteral folds, and the interureteric fold.

The internal urethral orifice may be recognized by withdrawing the speculum until the urethra commences to close over the end, and then pushing it in again for about  $\frac{1}{2}$  centimeter.

The ureteral orifices are important landmarks, and with the patient in the knee-breast position are often found at the summit of a small eminence, or the so-called “mons ureteris.” The ureteral fold or ridge is formed by the lower end of the ureter in its passage through the bladder-wall, and another landmark is the interureteric fold or ridge, which is found extending from one ureter to the other, and forms one boundary of the vesical triangle, or the “trigonum vesicæ.”

The normal groundwork of the bladder as it appears through the cystoscope is of a dull whitish color, everywhere divided by a network of branching vessels.

By elevating and depressing the handle of the cystoscope and moving it from side to side all parts of the posterior hemisphere can be brought into view. By moderately elevating the handle of the cystoscope the vault of the bladder is seen, and, as a rule, there will be found here a few cubic centimeters of urine which must be removed by the suction apparatus before all the parts can be distinctly seen.

The trigonum is brought into view by withdrawing the cystoscope until the internal urethral orifice just begins to close over it, and then pushing it in slightly. This portion of the bladder is always a little more injected and rosy than the rest of the mucosa. The ureteral orifices may be found by turning the cystoscope about

30° to the right or left, with the end projecting about 1 or 2 cm. into the bladder.

The urethra can be viewed from end to end as the cystoscope is withdrawn from the bladder: the walls fall together and form a funnel-shaped figure over the end of the instrument. The color of the normal urethra is a rosy-red, darker in brunettes, and exhibits radiating bands slightly lighter in color.

On closer inspection the orifices of the small urethral glands are seen, being more thickly placed on the lateral walls.

#### PALPATION.

The whole length of the urethra can be palpated through the vagina, and it is noted whether on pressure pus can be squeezed out,

FIG. 333.



Squeezing pus out of the urethra with the finger in the vagina.

then whether there is any tenderness present, either localized or general; the shape and consistency of the urethral tube, whether more rigid than normal or increased in thickness, and whether it can be rolled under the finger or is fixed by periurethral changes.

The base of the bladder may be palpated with the finger in the

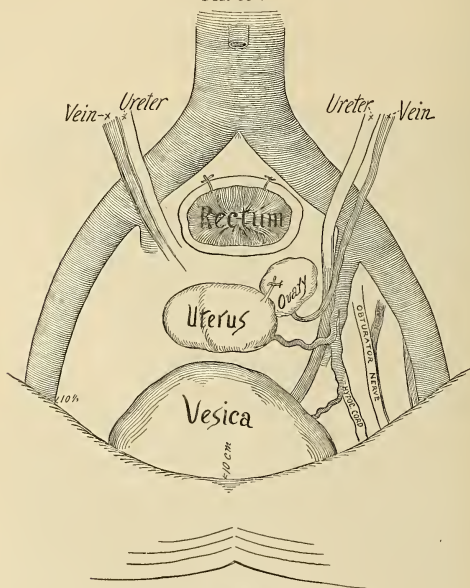
vagina, and thickening of the bladder-walls or the presence of foreign bodies may be made out by bimanual palpation, with the patient either in the usual dorsal position or with the patient in the knee-breast position.

#### EXAMINATION OF THE URETERS.

No portion of the ureters can be examined visually, save the ureteral openings into the bladder, unless an exploratory incision be made.

We have at our disposal two methods of examining the ureter:

FIG. 334.



Pelvic Portion of the Ureter viewed from below,

(1) Indirect, by means of the ureteral catheter or bougie; (2) By direct palpation through the vagina, the rectum, and the abdominal wall.

*Indirect Examination.*—The cystoscope is introduced as described, the orifice of the ureter located, and cleansed, if necessary, with a small pledget of cotton held in the mouse-tooth forceps.



# PLATE XXXVIII.

Fig. 1.

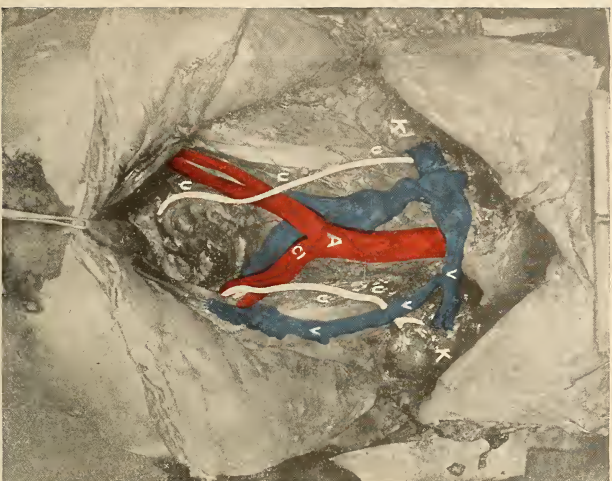
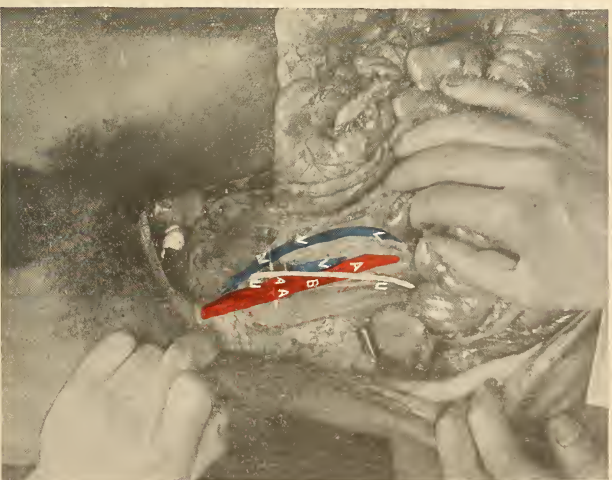


Fig. 2.



## FOURTH OF THE URETERS AND PELVIC BLOOD-VESSELS

FIG. 1.—A, abdominal aorta; CT, common iliac arteries; U, U, U, ureters; K, kidney.

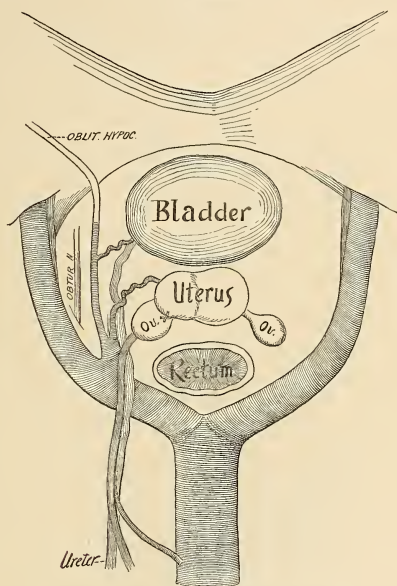
FIG. 2.—U, U, ureters; B, bifurcation of the common iliac artery; A, A, internal and external iliac arteries; V, common iliac and mesenteric veins.





India-rubber finger-cots are then placed on the thumb and fore finger of the hand to be used, and the long or short ureteral catheter is guided through the cystoscope and into the ureteral orifice, the point having been previously moistened with the boroglyceride solution. The assistant supports the outer end of the catheter, prevents

FIG. 335.



Pelvic Portion of the Ureter viewed from above.

it from touching the head or face of the examiner, and slowly withdraws the wire stylet as the catheter advances. But little force is necessary to carry the catheter upward, the feeling as soon as the orifice is passed being that the catheter is in a large free space.

By this means strictures of the ureter are discovered and localized. Stones lodged in the ureter may be detected in this way, and any distortion or twisting of the ureter will be seen in the shape that the catheter takes on its removal. The urine from the side catheterized is also collected and examined for any abnormal constituents.

*Direct Palpation.*—By the vagina the lower portions of the ureter, from its point of entrance into the bladder to the lateral and posterior walls of the pelvis, can be easily palpated, especially if changed and hardened by disease; and by the rectum it may be felt in its course along the posterior wall nearly or quite to the brim.

The abdominal portion of the normal ureter can only rarely be palpated directly through the anterior abdominal wall, but not infrequently a ureter hardened and thickened by disease can be so palpated, and almost always in ureteral inflammatory disease;

FIG. 336.



Course of the Ureters marked on the Abdomen.

marked tenderness can be elicited on pressure on points about 3 cm. (1 inch) to the right or left of the promontory of the sacrum, which is first located by deep palpation.

## DISEASES OF THE URETHRA.

### MALFORMATIONS.

*Complete Absence of the Urethra.*—This is a very rare condition, and is usually accompanied by other abnormalities of the genito-urinary tract.

The bladder opening is generally seen as a transverse slit on the anterior vaginal wall, and there is in most cases incontinence of urine, though occasionally the urine can be retained for a short time.

*Partial Absence of the Urethra.*—In this condition only a portion of the urethra is defective, the defect being either of the external or internal portion. If of the internal urethra, there is usually incontinence of urine, as the neck of the bladder is apt to be involved.

*Hypospadias.*—This is an absence of more or less of the inferior wall of the urethra, the anterior and part of the lateral walls being present, forming a groove where the urethra should naturally lie.

The condition varies greatly in degree, from the cases where the urethral orifice is only slightly displaced to those where the orifice is found in some position on the anterior vaginal wall, and is not to be seen on inspecting the external genitalia, the urine appearing to be discharged from the vagina.

Another variety of hypospadias is seen where there is persistence of the sinus uro-genitalis. In these cases there is only one opening present between the perineum and the clitoris, this being the outer ending of a canal which divides above to form the urethra and vagina.

*Atresia.*—This occurs as a congenital condition affecting either the whole urethra or only some portion of it. The urethra also may only be separated from the bladder by a thin septum, the septum being usually found at the junction of the urethra and bladder.

In some of the cases there exists an opening at the umbilicus through a patulous urachus, by which the fetus during its intra-uterine life discharges the urine, and the same condition will persist after birth as a patulous urachus, unless an opening is substituted below by operation.

Frequently, however, the fetus with a urethral occlusion has no avenue for the discharge of the urine, and the abdomen in such cases becomes so much distended as to require puncture before the delivery can be effected. In these cases there is, besides the marked dilatation of the bladder, double hydroureter and hydronephrosis.

**TREATMENT.**—Many of these affections do not call for treatment, either occasioning death during the intra-uterine period or being associated with other such serious malformations of the genitals as to exclude entirely the idea of any curative treatment.

The defects in the urethral wall may be closed by a plastic operation, taking flaps from the vaginal wall and forming with them a canal which should be a little larger than the normal canal to allow for the subsequent contraction.

Atresia, if due to a septum, may be perforated with a small trocar and cannula, thus establishing a communication which may be enlarged subsequently.

Other methods of treatment will be suggested by the character of the case.

### PROLAPSE OF THE URETHRAL MUCOSA.

CAUSE.—This condition is most frequently seen in young children, though it has also been noticed in women past the middle age. It appears following severe attacks of coughing or from straining at stool, and vesical calculi, urethritis, and rectal irritation from pressure, hemorrhoids, or prolapsus are also frequently associated with it. In women it is usually an eversion of that part of the mucous membrane lying adjacent to the external orifice. In little children, on the contrary, the eversion is from the deeper urethra.

SYMPTOMS.—Frequent and painful micturition and tenderness about the urethral triangle are the chief symptoms. It is also frequently attended by painful coitus and may interfere with walking.

DIAGNOSIS.—As the symptoms are not diagnostic, a visual examination is necessary. The prolapsed portion of the urethral mucous membrane appears as an intensely red, highly vascular tumor, in the center of which the urethral opening is found. In children the tumor is apt to be more prominent, and is usually of a deeper red or bluish color. If the prolapsus is of long standing, the mucous membrane may present a glazed, dry, or excoriated surface.

A condition of prolapse of one or the other of the ureteral eminences has been noted, simulating prolapse of the urethral mucosa; the diagnosis is, however, easily made by the presence of the ureteral orifice, and by the use of a small probe, which shows, when passed between the prolapsed portion and the urethral wall, where the eversion begins.

TREATMENT.—In recent cases, especially in children, after the prolapsed mucosa is replaced the patient should remain in bed for a few days, and astringent urethral suppositories or topical applications of dilute carbolic acid or iodine may assist in retaining the mucous membrane *in situ*.

The bowels should be kept loose, as straining at stool always increases the prolapsus, and the bladder should be carefully explored for stone, tumors, or polypi.

If the condition is persistent and does not yield to local treatment, the redundant mucous membrane should be excised and the external and urethral edges brought together by fine silk sutures. The sutures must be passed through the urethral mucosa before the incision is made to prevent retraction of the severed edges into the urethra.

#### DILATATION OF THE WHOLE URETHRA.

CAUSES.—This condition frequently follows unwise attempts to explore the bladder by rapid dilatation and the introduction of the index finger. It has been occasioned by dragging a large stone out of the bladder through the urethra, or by the spontaneous expulsion of large stones or pieces of tumor.

It is not uncommon in women suffering with either congenital or acquired atresia of the vagina, coitus being practised *per urethram*; and there are also instances where the dilatation was due to the daily insertion into the urethra of wax candles or other large bodies for the relief of sexual excitement.

SYMPTOMS.—Persistent incontinence of the urine and the irritation of the surrounding parts are the most trying symptoms, but, curious to state, in the cases in which the dilatation has been due to coitus *per urethram* there is rarely incontinence, the urine only escaping on coughing or some sudden exertion.

DIAGNOSIS.—This will be made as soon as the labia are separated and an examination attempted, the finger slipping into the dilated urethra while searching for the vagina, the dilatation being in some instances great enough to allow two fingers to be inserted through the urethra into the bladder.

TREATMENT.—The relaxation due to coitus should not be touched unless the vaginal canal can be restored, especially as the symptoms occasioned by this form are apt to be slight. If operative help is decided on, an area on each side of the external urethra may be divided and sutures passed in such a way as to produce tension, lifting the posterior wall of the urethra firmly up against the anterior. In this way the urine is held back until the obstruction is overcome by pressure from above.

The best method, however, of treating this condition is by excis-



ion of a portion of the anterior vaginal wall and of the posterior wall of the urethra, the excised portion of the urethral wall measuring 4 or 5 mm. in breadth. The edges of the wound are brought together by silkworm-gut or silk, the sutures holding together the edges of the urethra being carefully placed, approximating the edges of the wound exactly, and not entering at any spot the lumen of the canal.

The incontinence may also be controlled in some cases by using a pessary which will press against the urethra.

#### PARTIAL DILATATION OF THE URETHRA.

This condition is also known under the name of "urethrocele" or "sacculated urethra," and is usually situated in the middle third of the canal.

CAUSES.—Stricture or lessening of the caliber of some portion of the canal, either by a hyperemic condition of the mucosa or by pathological changes following inflammation, and pressure on the urethral wall behind the obstruction following from the retained urine. Childbirth may also be a cause, the pressure of the child's head during delivery bruising or wounding the middle portion.

FORMS.—The muscular wall may be thickened and hypertrophied around the sacculated portion, this form being usually seen where there is some obstruction to the outflow. On the other hand, the sacculation may be due to a prolapse of the mucosa through the muscular coat.

SYMPTOMS.—Frequent desire to micturate, with perhaps some incontinence of urine on exertion. In some cases, besides the frequent desire, a straining or difficulty in micturition will be seen. There are also the symptoms of urethritis present, as this condition usually accompanies the urethrocele.

DIAGNOSIS.—This can be made by passing into the urethra a sound with the point bent slightly downward, the area and degree of dilatation being mapped out between the sound and a finger inserted into the vagina. This lesion must not be mistaken for a simple prolapse of the anterior vaginal wall, the difference being easily made out when the sound is introduced: as in prolapse of the vagina, the axis of the urethra is in the normal direction. A cyst in this position can also simulate an urethrocele, but the differential diagnosis is made by the relations which are demonstrated by the sound.

It can be differentiated also from a suburethral abscess by the symptoms, the prominent tumor, and the pain on walking or coitus.

**TREATMENT.**—If only of slight degree, astringent bougies or applications, with relief of a stricture or other local condition, will usually effect a cure.

In the more marked cases the only method of relief is by operation. A wedge-shaped piece of tissue over the dilated portion is excised, removing the surplus tissue, including the whole thickness of the septum. The edges of the wound are brought together by silkworm-gut sutures, and a catheter is retained in the canal for two or three days.

#### STRICTURE OF THE URETHRA.

The strictures seen in the female urethra are generally circular and more or less localized, though they may affect the whole canal. They are of uncommon occurrence.

**CAUSES.**—Ulceration of the urethra as the result of chancroid or a very severe gonorrheal infection is apt to cause a localized stricture by the subsequent contraction of the scar.

Injury to the urethra during childbirth is also a frequent cause of stricture, as are other varieties of trauma.

Tubercular ulceration may also cause a narrowing of the lumen in one or more areas.

Neoplasms of the urethra are rare causes, though in the early stages, before ulceration has set in, they may narrow the urethral lumen.

General narrowing of the urethral canal may be the result of a severe urethritis or periurethritis, the tissues being the seat of a small-celled infiltration and subsequent contraction. There may also be narrowing due to carcinomatous or sarcomatous infiltration of the tissues around the canal.

**SYMPTOMS.**—In a large majority of the cases no symptoms are complained of, and the condition is only discovered accidentally. In a certain number of cases, however, the complaint of frequent and difficult micturition, gradually increasing, is made, and in rare cases there is incontinence, or, on the other hand, there may be infrequent micturition, at times approaching retention. In cases of long standing, cystitis or dilatation of the bladder may result.

**DIAGNOSIS.**—As the symptoms are not sufficiently suggestive, the urethra should always be examined. A vaginal examination usu-

ally shows thickening at some point on the anterior wall corresponding with the course of the urethra. If a sound be introduced, it will meet with resistance at this point, and it may be impossible to pass it farther.

**PROGNOSIS.**—This should always be guarded, as the stricture will again occur unless it can be dilated at intervals. Cystitis or dilatation of the bladder is always a dangerous symptom and gives a more unfavorable prognosis.

**TREATMENT.**—Gradual dilatation should be practised by means of Hegar's dilators, starting with one of the small sizes and gradually increasing the size until a No. 10 or 12 is reached. Care should be used not to rupture the urethra by too rapid dilatation, as incontinence may result from such an accident. Very rarely, when the cicatricial tissue is dense and unyielding, division of the stricture according to "Otis' method" in stricture in the male may be required.

In the rare cases where the stricture cannot be dilated an opening between the urethra and the vagina behind the stricture may be made, and the edges of the urethral mucosa stitched to the vaginal mucosa by fine silk sutures. In making this incision the neck of the bladder must be carefully avoided, as otherwise incontinence will result.

### URETHRITIS.

**CAUSES.**—In a large majority of the cases the urethritis is due to a gonorrheal infection, and is only part of a general infection of the genital tract. In other cases the inflammation is due to the presence of the tubercle bacillus. In other cases, again, the urethritis follows a trauma, as in childbirth, a suppurative or diphtheritic cystitis, or inflammation of the neighboring organs. There is also a certain mild form of urethritis seen in women where there has been no opportunity for infection by contagion, and where there can be no suspicion of gonorrhea, and which runs its course in a few days.

**SYMPTOMS.**—In the milder forms of urethritis the principal complaints are of a burning pain on micturition, of an increased frequency in the desire to pass the urine, and of a slight purulent urethral discharge. There is also some tenderness on pressure on the urethra, and perhaps swelling and a slight tendency to prolapse of the swollen mucous membrane.

In the gonorrheal urethritis there is at first, following the infection, an itching sensation in the urethra, followed in a day or two by the sensation of burning or stabbing pain on micturition, and generally increased frequency of the desire to void the urine. If the urethra is examined during the first day or two, very little can be made out: there is a slight serous or sero-purulent discharge from the meatus and some pain on pressure. Later the discharge becomes purulent, and on pressure can be squeezed out of the urethra, appearing at the meatus as a yellowish drop.

The meatus will be found reddened, the edges everted with a tendency to slight prolapse of the mucosa, and if a speculum be introduced the whole urethral mucosa is found reddened and much swollen. On pressure through the vagina the urethra is tender.

Tuberculosis of the urethra is usually seen as an ulcerated area, and it is almost always secondary to bladder tuberculosis, and the symptoms are therefore apt to be masked by the bladder condition.

DIAGNOSIS.—This should be based on the symptoms, the burning pain on micturition being quite characteristic. A visual examination should also always be made, noticing first the condition of the meatus, then with the finger in the vagina pressing on the urethra and noting the pain, and also whether pus can be squeezed out. The pus squeezed out of the urethra should always be examined microscopically, determining in this way the presence of the gonococcus or other organism present.

A local examination should always be insisted upon, as the symptoms are usually not characteristic enough to allow of a differentiation between urethritis and certain forms of cystitis, and it is of great importance in the treatment that this differentiation be made.

TREATMENT.—In the very acute forms rest in bed is necessary. A light, easily digested diet should be ordered, advising also the use of some mineral water to lessen the acidity of the urine, or the citrate of potash, taken in 20 gr. doses three or four times a day, may be used for the same purpose. Locally, hot applications to the vulva or the hot vaginal douche, containing, if there is a suspected gonorrhea, the bichloride of mercury in solution, should be ordered.

Later urethral irrigations may be practised, using dilute solutions of the bichloride of mercury or of nitrate of silver.

Medicinal agents may also be applied to the urethra in very soft ointments, being introduced through a small-sized cystoscope.

In the chronic forms, where there are ulcerated or granulating areas, local application through the cystoscope of weak nitrate-of-silver solutions is the best form of treatment.

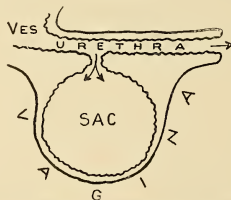
#### SUBURETHRAL ABSCESS.

CAUSE.—This condition is quite rare, and the cause is uncertain, though it is usually attributed to distention and ulceration of one of the glands in the floor of the urethra, or in other cases to rupture of fibres of the urethra, with a sagging at this point, where the urine accumulates and decomposes, occasioning inflammatory changes and abscess-formation.

SYMPTOMS.—Usually painful micturition, gradually increasing in severity, and a discharge of ammoniacal urine or pus on changing the position or on coitus. Pain during coitus and the presence of a painful tumor in the vagina.

DIAGNOSIS.—This is easily made by examination, there being found in the anterior vaginal wall a tender ovoid fluctuating tumor,

FIG. 337.



Urethral Diverticulum, containing pus and residual urine.

which partially disappears on pressure, the pus being squeezed out into the urethra. It can be differentiated from cysts of the vaginal wall by the tenderness and by its communication with the urethra, and from a "urethrocele" by the great tenderness, the presence of a circumscribed tumor, and the general symptoms.

TREATMENT.—The best method is by excision, removing an elliptical piece of the vaginal mucosa, and carefully dissecting out the whole cyst-wall down to the urethra, which is left intact, followed by immediate closure of the wound by silkworm-gut sutures.

A slower method is by an incision through the abscess-wall, the cavity being packed with gauze, thus keeping the incision open and allowing it to heal by the formation of granulation tissue.

## NEOPLASMS OF THE URETHRA.

The portion of the urethra most apt to be affected is the external orifice, though growths in other portions are not uncommon.

The neoplasms are divided into (1) the benign, and (2) the malignant neoplasms.

## CARUNCLE.

This is a tumor usually located at the external meatus, involving one or both lips and appearing as a raspberry-red tumor, exquisitely sensitive and bleeding readily upon touch.

**SYMPTOMS.**—As the growth is usually exquisitely sensitive, the acute pain on micturition is easily explained. There is also great pain on coitus, simulating at times a condition of vaginismus, and in some cases there is pain on walking. The bleeding is small in amount, never giving rise to free hemorrhage.

These tumors are made up of connective tissue in which courses an extensive network of blood-vessels covered by flattened epithelial cells.

It is not precisely known to what the sensitiveness is due—whether, as is most probable, to an unusual nerve-supply, or whether to the baring of the nerve-endings by the destruction of the epithelium of the surface.

**TREATMENT.**—Excision is the only treatment which will give relief. This may be done under cocaine anesthesia, any hemorrhage which may appear being controlled by the sutures which are passed immediately, bringing together the edges of the wound.

A better result is obtained by using general anesthesia, as the growth may then be more carefully removed and better coaptation of the edges of the wound will be obtained, as the patient is perfectly quiet.

## CONDYLOMATA.

**CAUSES.**—These warty growths are usually found in connection with similar disease of the other parts of the external genitals, and are most frequently seen in cases of gonorrhea, though they are occasionally present where there is a non-specific irritating discharge. Filth and dirt are also causes.

**SYMPTOMS.**—The small growths give rise to no symptoms; the larger growths are troublesome only from their size.

**DIAGNOSIS.**—This is easily made from an inspection of the external genitals. The growths, usually multiple, are of a pale pinkish



color, usually tipped with white, more or less pedunculated, and with a tendency to confluence and the formation of large tumors. The microscopical picture is that of a warty growth, the groundwork of the tumor being connective tissue in which the blood-vessels are distributed; the layer of epithelium covering it is increased in thickness.

TREATMENT.—Each condyloma is to be snipped off with a pair of sharp scissors, and the bleeding point touched with the thermo-cautery. The larger growths may either be removed by the thermo-cautery or with the knife. If the knife is used, the thermo-cautery or a few fine silk sutures will be necessary to control the hemorrhage.

#### URETHRAL POLYPI.

These are rare growths, sometimes appearing in the adult and sometimes being congenital. They may be multiple, or only a single tumor may be present, consisting of a groundwork of closely packed connective-tissue fibers, covered with several layers of pavement epithelium and having the same appearance as fibromata elsewhere.

TREATMENT.—They may be removed with the curette and scissors, or, if there is only a single one deeply seated in the urethra, a snare may be used.

#### CYSTS OF THE URETHRA.

CAUSES.—These are usually formed by the occlusion of the orifice of a urethral gland. They are not limited to any one age, and, though not extremely rare, are uncommon.

SYMPTOMS.—The cysts are apt to occasion difficulty in micturition, and if situated near the external orifice may protrude through it, giving rise to a tumor which must be differentiated from prolapsus, caruncle, or fibroma.

TREATMENT.—Puncture of the cyst, or, if it is troublesome, removal by urethrotomy, the wound in the urethra being closed immediately by fine silk sutures. Care must be taken that in introducing the sutures they do not pass entirely through the mucosa and enter the lumen of the urethral canal.

#### CONGENITAL MALFORMATIONS OF THE BLADDER.

*Complete Absence of the Bladder.*—This is a very rare condition, and in most cases it is rather a marked atrophy of the organ than a complete absence. If the bladder is, however, completely

absent, the ureters open either into the urethra or into the rectum. Usually, as most of these cases are accompanied by other marked abnormalities, the child is either dead born or dies soon after birth.

*Double Bladder.*—Cases of true division of the bladder into two halves are exceedingly rare, and it is probable that most of the cases described as double bladder by the older authorities were, in fact, cases of extreme sacculation. There have been, however, some cases reported where there was undoubtedly a division of the bladder into two halves. Usually the septum runs antero-posteriorly, there being one ureteral orifice present in each half. The urethra opens into either the right or left half, and there is an opening in the septum to allow the urine to pass from the other half into the urethra. The condition of double bladder, besides the sacculation above spoken of, which is usually the result of disease or of displacement, may be simulated by a dilated urachus, though from the position this is easily recognized.

It is also possible for a congenital cyst in close proximity to the bladder to simulate a supernumerary bladder.

None of these conditions demand any treatment, the condition being only discovered at the autopsy table.

*Extroversion or Exstrophy of the Bladder.*—This anomaly is far more frequent in the male than in the female sex, it occurring about once in the female in every five cases seen. The abnormality varies greatly in degree. According to Güterbock, the following forms may occur:

(1) A diastasis of the abdominal muscles and of the symphysis pubes, the bladder, covered by the normal skin, projecting through this opening.

(2) A diastasis of the muscle, symphysis, and skin, the closed bladder projecting from this opening, connecting, however, in the usual manner with the normal urethra.

These two forms are usually classed as hernia of the bladder, though they evidently arise in the same manner as the more marked forms of extroversion.

(3) The true extroversion is divided into (a) "fissura anterior totalis vesicæ," and (b) "fissura anterior partialis vesicæ," which is a much rarer form, the opening being either above at the upper portion of the bladder or below near the base. Under this second form may be classed also the patulous condition of the urachus.

On examining these cases of true extroversion a separation of the abdominal walls and of the symphysis pubes will be found, the space between the pubic bones being either slight or extensive, and either filled in with fibrous tissue or existing as an unobstructed opening. In the opening thus formed will be found the bladder pushed forward by the viscera crowding down upon the posterior surface. It appears as a red, spongy-looking mass, usually encrusted in places by the urinary salts, or there may be ulcerated spots in various parts of the wall. The ureteral orifices will be found either at the summit of small eminences or perhaps hidden in a fold of the bladder-wall, and there will be seen every few moments a spurt of urine from one or the other side. The clitoris is usually found divided, lying on the two sides of the opening, although in some cases there is entire absence of any attempt at the formation of this organ.

The vagina may be normal or may appear as an elongate transverse fissure.

The uterus and its appendages are usually normal.

**SYMPTOMS.**—The symptom complained of most bitterly is the constant flow of urine over the surrounding parts, giving rise, unless great cleanliness is observed, to troublesome excoriations. The constant urinous odor which always attends these patients is also a great source of mortification.

Pain is also complained of from the irritation and rubbing of the clothes on the protruded bladder, and there is apt to be slight hemorrhages from this source. There is also apt to be inflammation of the mucosa with ulceration, and this adds to the discomfort from the pain and profuse purulent discharge, as well as to the danger to life from an ascending ureteritis and pyonephrosis.

**TREATMENT.**—The treatment of this anomaly is a subject of no little importance, from the great distress occasioned by the constant dribbling of the urine and the excoriation of the parts. In all cases the treatment, whether operative or mechanical, is only palliative, as the function of the bladder cannot be completely restored. Various mechanical devices have been employed for conducting the urine away from the bladder, but they are usually unsatisfactory, and the repair of the defect by a plastic operation should always be attempted. On account of the impossibility of keeping the field aseptic, failure is frequent, and many operations may be required to accomplish the result desired.

A number of ingenious operations have been devised for exstro-

phy of the bladder, but those employing a central flap made from above, with lateral flaps, appear to be the most advisable. Thiersch's operation embraces these principles, and is frequently successful. The deformity of the urethra should first be corrected before the vesical defect is repaired.

The method as devised by Thiersch consists, first, in the lifting up of a flap from the centre of the abdomen above the opening. This flap should be of sufficient size to close the bladder, and must have a pedicle. The edges of the abdominal opening are freshened, and the flap is brought down in such a way as to throw the skin surface against the mucous membrane of the bladder. The margins of the flap are then stitched to the denuded edges of the abdominal opening.

Bridge-like flaps are dissected up from the inguinal region on either side of the opening, leaving both ends attached. Iodoform gauze is packed beneath these flaps until granulation springs up and the nutrition of the parts is well established, when the upper ends may be cut and the flaps pushed over upon the granulating surface of the central flap and secured in place by suture. In this way the first flap is reinforced and the lateral edges of the divided opening are protected. In all these cases there will be incontinence of urine, as the sphincter muscles are absent, and so far no method of treatment has been advanced to replace their function. For this reason some form of ambulatory urinal is required.

Thiersch, in order to do away with the necessity of using a urinal in women, has established an artificial channel from the bladder to the rectum. This is not advisable, as the rectum is not tolerant to urine, and if it loses its function the condition of the patient is more deplorable than it was in the beginning.

Billroth advises making a small opening through the central flap, as the recti muscles often close the opening sufficiently to retain the urine. Skin-grafting may be used if the skin does not extend to the center of the flap.

Preceding operations for the restoration of extroversion, the surrounding parts must be restored to a healthy condition by the liberal use of the zinc-oxide ointment. The urine should be kept bland by the proper drugs if it tends to produce irritation. The general nutrition of the patient should be carefully looked into, and no operative measures instituted before she is in good health. If the operation be successful, some form of ambulatory urinal may be

prescribed, and the patient is able to live more comfortably, as the excoriation and inflammation of the surrounding parts, the disgusting odor and constant dribbling of urine, are obviated.

#### DISPLACEMENT OF THE BLADDER.

These may be divided into—(1) Upward displacement, (2) Downward displacement, (3) Prolapse of the bladder.

*Upward displacements of the bladder* are most frequently observed in large myomatous tumors of the uterus, where, as the tumor develops, the bladder is dragged up with it.

**SYMPTOMS.**—There are usually no symptoms complained of, though occasionally there may be frequent urination.

**TREATMENT.**—The only method is by the removal of the tumor.

*Downward Displacements of the Bladder.*—This condition is seen in its mildest grade, where, with a laceration of the perineum, there is a tendency to downward displacement. The so-called cystocele or prolapse of the anterior vaginal wall, which is so common in multiparous women, must not be confused with this condition.

A more marked displacement is seen accompanying partial or complete prolapse of the uterus, and rarely, with complete prolapsus of the uterus, the whole bladder may be displaced outside of the body.

**SYMPTOMS.**—As there is in these cases almost always some residual urine, there is apt to be a cystitis present. There is usually, too, complaints of inability to pass the urine, and in some cases the uterus and bladder have to be replaced by the hand before the urine can be passed. Calculi may also form in the dependent portion of the sac.

**DIAGNOSIS.**—This can be easily made by passing a somewhat curved sound into the bladder, and with this finding its limits above and in the prolapsed portion.

**TREATMENT.**—This is the same as that for prolapsus uteri—namely, amputation of the cervix if necessary, repair of the relaxed vaginal outlet, and possibly suspension of the uterus to the anterior abdominal wall.

*Prolapsus of the Bladder through a Patulous Urethra.*—This condition is rarely seen, and is most probably due to a trauma or severe strain.

**SYMPTOMS.**—The presence of a tumor at the urethral orifice, incontinence of urine, pain and tenderness on walking and moving, and probably inflammation of the prolapsed portion.



**DIAGNOSIS.**—This may be made by the appearance of the tumor, one or both ureteral orifices being seen on it, and by passing a sound along the side of the tumor it will be found to enter the bladder.

**TREATMENT.**—After the prolapse is reduced the patient should remain on her back for some days. The bowels must be carefully regulated, and the urethra, if not much dilated, may be reduced in size by the use of astringent suppositories or applications.

If the urethra is much dilated, a plastic operation for the narrowing of its lumen must be practised.

#### FOREIGN BODIES IN THE BLADDER.

Foreign bodies may gain entrance to the bladder—(1) from above, through the ureter; (2) from below, through the urethra; (3) from ulceration through the bladder-wall; or (4) calculi may be formed in the bladder itself.

The foreign bodies entering the bladder from above, through the ureter, are usually calculi, though blood-clots, clots of inspissated pus, or small echinococcus cysts may also enter the bladder from the kidney or ureter.

The foreign bodies gaining entrance through the urethra are either catheters which have been introduced by physicians and slipped into the bladder suddenly, or they are bodies introduced by the patient herself, such as hairpins, knitting-needles, bodkins, stems of grass, etc.

Foreign bodies gaining entrance through the wall of the bladder are rarer than the other varieties. They may enter the bladder from the vagina by ulcerating through the partition walls; for instance, a pessary may gain entrance in this manner. Teeth and hair from a dermoid cyst have also been found in the bladder, as have fecal concretions from an appendicitis which has ruptured into this viscus. The commonest foreign bodies which gain entrance through the bladder-wall are sutures or ligatures which have been used during operations on the uterus or other pelvic organs.

In fractures of the pelvis small pieces of bone may be forced through the bladder-wall or through a rupture of the wall into the vesical cavity.

Calculi formed in the bladder itself are the most common foreign bodies, and may either be composed of the earthy phosphates, urates, or uric acid, or several of these; the other varieties of vesical calculi are more rare.



**SYMPTOMS.**—Usually during the first few hours no symptoms are present; after the lapse of from twelve to twenty-four the usual symptoms of a cystitis—namely, greatly increased frequency of micturition, with probably bladder tenesmus, the passage of bloody urine, and with constant pain in the vesical region—will make themselves apparent.

**DIAGNOSIS.**—This, in a certain number of the cases, will be easily made from the history of the case; in a certain percentage, however, no history at all can be obtained of the introduction of the foreign body into the bladder, and the physician must make the diagnosis from a general study of the patient, from sudden acute onset of the symptoms with no apparent cause, by a vaginal examination, feeling for the foreign body through the vaginal walls, and lastly by a cystoscopic examination.

**TREATMENT.**—There are three ways of removing from the bladder a foreign body—namely, (1) through the urethra; (2) by an incision through the vaginal walls into the bladder; or (3) by the “section alta” or suprapubic cystotomy.

Removal through the urethra method should always be attempted first, especially if the body is long and narrow, as a glass catheter, bodkin, hairpin, etc. The operator introduces one or two fingers in the vagina, attempting to engage one end of the body in the internal urethral orifice; if this can be done, it may either be pushed on with the vaginal finger or caught by a pair of forceps introduced into the urethra and pulled out in this manner.

Articles which are soft and easily bent may also be removed through a medium- or large-sized cystoscope, using for the purpose a special pair of forceps or a small tenaculum. When the above method fails entrance into the bladder through the vagina may be practised. The anterior vaginal wall is exposed, and an incision through the wall in the median line is made, thus exposing the wall of the bladder, which is then opened, taking care that the incision through the bladder does not touch or include the internal urethral orifice. The foreign body is caught with forceps and removed, the wound being closed in the same manner as a vesico-vaginal fistula.

**VESICAL CALCULUS.**—Vesical calculi rarely occur in women, because of their short and patulous urethræ. Renal calculi which are expelled into the bladder, and in men often form the nucleus for a much larger stone, are in women swept out during the first micturition. It is probably very seldom that a stone descends from the

kidney and remains a sufficient time in the female bladder to gain by accretion a size which prevents its expulsion through the urethra. The fact that a large proportion of calculi in women are discovered after the repair of vesical fistulæ goes to prove that they are formed in the bladder, and are not simply the enlargement of stones from the kidney. After vesico-vaginal operations, if the stitches are allowed to pass through the mucous layer of the bladder, it is probable that the nidus for the stone may be furnished by the exposed suture. Emmet claims that such operations are the most frequent source of stone in women. Calculi may be of various kinds, as uric acid, urates, triple and amorphous phosphates, oxalate of lime, or cystine. Phosphatic stones are more frequent in women than in men, while those of uric acid are less frequent. It is rather difficult to account for this difference in their occurrence in the two sexes, but it is possibly due, as explained by a number of writers, to the more frequent tendency of men to a gouty or lithemic diathesis. Foreign bodies introduced for various purposes by hysterical women may form the nucleus of a stone. Thus, hair-pins, bits of wax, buttons, beans, etc. have been found as the centre of vesical calculi. Usually the bladder contains but a single calculus, but occasionally two or more are found. The most common shape is a flattened ovoid, although they may be somewhat rectangular or irregularly rounded, while phosphatic stones are occasionally curiously branched.

On account of the patulous urethra in women, calculi of small dimensions are rarely found; they vary from the size of a pea to that of a walnut and are often much larger. The density of the calculus depends upon its chemical composition, the phosphatic variety being the most friable and easily crushed. The situation of the stone varies with the position of the patient. When she is in an upright position, it will usually be found at the base of the bladder or blocking the orifice of the urethra, but if recumbent the stone will drop back toward the fundus. It may be encysted or caught by a fungous mass or retained between the rugæ of an hypertrophied bladder-wall. If there be a diverticulum in the bladder, as is often seen accompanying prolapsus uteri, the stone will be found at the bottom of this sac. Occasionally it is lodged in the orifice of an ureter. The author removed a stone within the last two years which he had previously located in the mouth of the left ureter by means of the ureteral sound.

ETIOLOGY.—The causes of calculi are obscure. The reason for

the deposit of urinary salts about a foreign body is perfectly patent, but the origin of a stone in the centre of which no foreign body can be found is not so clear.

In those cases of prolapsus uteri in which a vesical diverticulum exists, calculi are prone to form, as these sacs usually contain residual urine, and when one observes, under the microscope, the manner in which urinary crystals are often entangled in the shreds of mucus, it may quite as reasonably be expected that the same result will take place in the diverticulum of the bladder, thus leading to the formation of a calculus.

**SYMPTOMS.**—The symptoms which are most characteristic of stone are frequent micturition, with sudden stoppage in the flow, hematuria, and pain. An irregular, halting, and painful flow of urine is, of all symptoms, the most characteristic. It usually occurs when the stone is small, and is sucked into the vesical mouth of the urethra, acting as a ball-valve. As it grows in size this tendency often entirely disappears. Frequent micturition is usually a constant symptom, the patient being compelled to void her urine many times during the day, especially when she is on her feet or doing active work. During the night this urgent and frequent desire to void the urine disappears, and the patient may pass a whole night without once getting up. Horseback riding or driving over rough roads often causes severe pain.

The pain in vesical calculus is of two kinds—that directly caused by the stone, and that produced by the cystitis which almost invariably follows as the result of vesical irritation. There is constant, heavy, dull pain over the pubes, radiating down into the legs and external genitalia and upward to the groin. The pain, which is characteristic, is sharp and lancinating, and occurs at the end of micturition, frequently being referred to the external genitalia, and is so severe at times as to cause the patient to scream. Violent straining accompanies micturition, and the attending pain may be referred to the rectum or perineum, especially if there are hemorrhoids or if prolapsus of the rectum exists, as frequently results from the straining efforts.

In little girls the pain may be entirely referred to the vulva, and lead to a habit of constantly dragging or picking at the parts, which causes hypertrophy and excoriation of the labia.

Hematuria is frequent, but is characteristic only when a few drops of bright-red blood appear at the end of micturition.

DIAGNOSIS.—Any of the above symptoms may cause the surgeon to suspect stone, but a definite diagnosis is impossible until a careful exploration of the bladder is made. This may be done in one of three ways—by the sound (which is the best), by digital exploration, or by the cystoscope.

The same precautions should be observed in sounding for stone as in catheterization, as this manipulation furnishes an opportunity for the introduction of septic material if the technique is not perfect. The patient should be placed in the lithotomy position, with the thighs flexed upon the abdomen. The vagina and external genitalia should be thoroughly washed with soap and water, then rinsed with boiled water, and then with bichloride-of-mercury solution (1:1000), and again with water.

A piece of gauze one yard square should be spread between the thighs over the buttocks, and a hole made of sufficient size to permit the free manipulation of the sound. It is also well to have the patient's legs enveloped in sterilized stockings or towels. By the observance of these small details the best aseptic technique is obtained. The bladder should be emptied of its urine, and partially distended with boracic-acid solution or sterilized water. The surgeon either stands or sits between the patient's thighs when introducing the sound, which should previously be warmed and anointed with sterilized vaseline. In sounding a definite plan should be followed: The base of the bladder should first be carefully explored, and then the sound should be caused to make excursions upward and to the sides. During this manipulation two fingers of the hand should be introduced into the vagina, and it will be almost impossible for a stone to elude the search.

If this examination be negative and the surgeon is still in doubt, he may resort to the cystoscope, or the urethra can be dilated to the size of the index finger and a digital exploration made. In this way an encysted stone may be detected. In chronic cystitis or where vesical neoplasms exist in the walls of the bladder, or in the presence of a tumor encrusted with urinary salts, a peculiar grating sound may be elicited by contact with a metallic instrument.

The main points of difference as elicited by the sound between this condition and stone is the extensive area of deposit and the lack of resistance when the instrument is pushed against it. The surgeon should always bear in mind that a calculus may be asso-

ciated with a vesical tumor, a fragment of which has served as the nucleus of the stone.

**PROGNOSIS.**—If the stone be detected early and removed before marked changes in the bladder have occurred, the prognosis is quite favorable. On the other hand, if cystitis exist associated with hypertrophy and contraction of the wall of the bladder, or if there is secondary disease of the kidneys, the prognosis is unfavorable, the patient dying or from the progress of the renal disease. This, however, is very rare, as the symptoms of stone are usually so urgent as to lead to its detection before such grave lesions occur.

**TREATMENT.**—There are three modes of treatment employed in cases of vesical calculi in women: by dilatation of the urethra and removal of the stone, if small, by forceps, or if large by crushing; by kolpo-cystotomy; and by suprapubic cystotomy. As the urethra is capable of considerable dilatation, the first method will, in a certain number of cases, be the most available. The urethra should not be dilated larger than the girth of a medium-sized forefinger, as the sphincter fibres may be lacerated, causing permanent urinary incontinence. After the urethra has been dilated the surgeon introduces his finger into the bladder and locates the stone. If not larger than the tip of the little finger, it may be grasped with delicate forceps and removed, or coaxed up to the neck of the bladder and out through the urethra by means of two fingers in the vagina. Should the stone be large, it is not advisable to remove it intact, as the urethra may be so overstretched that incurable incontinence will result.

Lithotripsy is usually considered the best mode of treatment when the stone is not too large or too dense to permit of crushing. The patient is placed in the same position for this operation as when examined for stone. The urine should be withdrawn, and the bladder partially distended with tepid boracic-acid solution. The surgeon, sitting between the patient's thighs, introduces the lithotrite, previously warmed and anointed with sterilized oil or vaseline, into the urethra in a line almost perpendicular with the long axis of the body. The handle of the instrument is then depressed, when it gently glides into the bladder.

Two fingers of the disengaged hand should then be introduced into the vagina and the stone located. An assistant now opens the blades of the lithotrite, and with a little manipulation the stone will be seized, when the instrument should be very gently rotated to



obviate the danger of catching the mucous membrane, and the screw slowly turned until the stone is crushed; this will be sudden or gradual according to its composition. The blades are then separated and again closed, catching one of the larger fragments, and so on until the stone is reduced to small particles. It is rarely necessary to resort to an evacuator, as repeated irrigations of the bladder are sufficient to remove the fragments. During the irrigations the bladder should be manipulated gently between one hand introduced into the vagina and the other placed above the pubes.

Every particle of the stone should be removed, as small fragments, if left behind, may form the centres of other calculi. If the stone be thoroughly pulverized, there is no danger of fragments being impacted in the urethra. In case, however, a part of the stone eludes the grasp of the lithotrite and later becomes impacted, it may be removed by means of delicate urethral forceps, or, if lodged in the mouth of the urethra, it can be pushed back with a sound and crushed with the lithotrite.

Urethral fever is not an infrequent complication following the introduction of instruments into the bladder, especially after lithotripsy. It is characterized by the occurrence of rigors, with headache and vomiting, followed by febrile reaction. It is especially liable to occur in nervous women, but is not a serious complication, and usually passes off in one or two days. Temporary aggravation of the already existing cystitis may result from manipulation of the lithotrite.

*Contra-indications to Lithotripsy.*—Lithotripsy should not be resorted to in girls under thirteen years, as the urethra is too small to allow sufficient manipulation of the instruments, and as lithotomy is such a safe operation at this age, it should always have the preference. The size of the stones should be estimated carefully, as a stone of greater diameter than once inch can more easily be removed by kolpo-cystotomy. In those cases of sacculated bladder occurring in prolapsus uteri or in cystocele, lithotripsy is not practical, as small particles of the calculus are likely to be left in these dependent pouches. Chronic cystitis usually coexists in these cases, for which reason cystotomy is preferable, as we thus not only remove the stone, but also secure free drainage, which will often be necessary to cure the accompanying inflammation of the bladder.

If the calculus be associated with a vesical neoplasm, lithotripsy is contra-indicated, as the manipulation of the lithotrite might induce



a profuse hemorrhage, and the removal of the stone, if the tumor be left behind, would give little or no relief.

Cystotomy is the next operative measure to be considered if removal of the stone through the urethra be contra-indicated. In women kolpo-cystotomy is almost invariably the operation of preference, as it is comparatively easy and free from danger, and is applicable to the largest number of cases. This operation is best performed according to Emmet's method, as follows: A sharply-curved sound is introduced into the bladder so as to depress the vesico-vaginal septum. The vaginal side of the septum is then caught with a tenaculum and a small opening made, which may be enlarged with scissors by cutting upward toward the cervix, keeping in the median line and thus avoiding the ureters. If there is only a mild grade of cystitis, the fistula should be closed immediately after extraction of the stone; on the other hand, should the cystitis be chronic, with considerable pus and exfoliated epithelium in the urine, the opening should be left, thus securing constant drainage.

Suprapubic cystotomy is rarely necessary, but may be required in those cases in which the stone is too large to admit of vaginal lithotomy. Greater care is necessary in opening the abdomen of women than of men not to wound the peritoneum.

The treatment after all operations for stone is simple. In those cases in which the fistula is left open or in which dilatation of the urethra is performed, the bed should be well protected with old linen, as there will be a constant discharge of urine.

The parts with which the urine is liable to come in contact should be anointed with vaseline, and if there is any tendency to the formation of incruusted urinary salts, the parts should be scraped gently and anointed with oxide-of-zinc ointment. A light diet must be insisted upon, and the urine kept bland by means of an abundant ingestion of pure water. Citrate of potash should be administered if the urine is acid, and benzoic acid if it is alkaline. The patient should return to the surgeon for examination at least once every year after the removal of a calculus, to ascertain if there be any recurrence.

#### CYSTITIS.

ETIOLOGY.—This is the most important question that meets us in the study of cystitis, and, though much important work has been

done, there are many questions which are still unanswered. That the exciting cause of every cystitis is the presence of pathogenic organisms in the bladder is beyond question, and the first point is to determine the various channels by which bacteria may gain an entrance to this viscus.

(1) Organisms may enter the bladder through the urethra. That the normal urethra is the abiding-place of various organisms is well known, and it is easy to see how these organisms might be carried into the bladder by the use of even an aseptic catheter or other instrument.

Again, pathogenic organisms may be carried into the bladder on instruments or catheters which are themselves septic. And undoubtedly, in certain cases where the urethra is dilated and patulous, the organisms may enter the bladder directly from the urethra without using instruments.

(2) Organisms may enter the bladder through the ureters. A secondary tubercular cystitis following a renal tuberculosis is a good example of this method of infection. There is also another variety of descending infection, the organisms being present in the circulation and excreted by the kidney, entering the bladder by this means without injuring severely the kidney itself.

(3) Organisms may enter the bladder from inflammatory areas in the neighboring organs.

This method of infection has been definitely proved, both by clinical cases and experimental work, and serves to explain the frequent occurrence of cystitis in women suffering with inflammatory diseases of the uterus, the tubes, or the ovaries.

(4) Organisms may enter the bladder-walls through the bloodstream.

This manner of entrance must also be admitted, as in no other way can we explain the occurrence of primary tuberculosis of the bladder and also the occurrence of abscesses in the bladder-wall.

The next questions to be taken up are the predisposing causes of cystitis, as we know that the mere presence in the normal bladder of pathogenic organisms is insufficient in itself to start up a cystitis, and that besides the presence of the organism there are other conditions necessary.

Some of these conditions we know, both from clinical experience and experimental study, but unfortunately there are still many cases in which the predisposing cause is entirely unknown.

(1) Retention of the urine is undoubtedly one of the predisposing causes, and under this head may be classed the cases where there is prolapsus of the bladder, and therefore incomplete emptying.

(2) The passage of irritating substances through the bladder, causing a congestion of the bladder-walls, under this division coming the cases of cystitis following the ingestion of irritating drugs, as cantharides, turpentine, etc.; also the use of highly seasoned food and stimulating drinks; and also we may class here a portion of the cases of cystitis following operation, the urine being irritating because of the high specific gravity and large amount of urea and uric acid present.

(3) Another predisposing cause is slight wounds of the bladder occasioned by the unskilful use of the catheter or other instrument; and we must class here a portion of the cases of cystitis following operations, the bladder being wounded by the catheter.

(4) The congestion of the bladder following inflammation of any of the pelvic organs is a predisposing cause, as is seen in the number of cases of cystitis following inflammatory conditions of the tubes, ovaries, or uterus.

(5) Foreign bodies are also a cause, probably acting by wounding the bladder-walls, and so allowing entrance to the organisms.

(6) New growths are also apt to be accompanied by cystitis.

That no special organism causes inflammation of the urinary tract has been decided from the bacteriological study of a large number of cases, which prove that any pathogenic organism under the proper conditions may give rise to inflammation of the bladder.

The organisms generally found are the staphylococcus pyogenes albus and aureus, the streptococcus pyogenes, the bacillus coli communis, several varieties of the proteus, the typhoid bacillus, the tubercle bacillus, and the gonococcus of Neisser. Besides these, many other of the less common pathogenic organisms have been isolated once or twice.

The infection may be due either to the presence of a single variety of bacteria or, as is often the case, there may be several varieties present—in other words, a mixed infection.

*Forms.*—Formerly all cases of cystitis were grouped under the head of acute and chronic, and we may still retain this division, subdividing again, however, to suit the pathological or clinical conditions present.

The mildest grade of cystitis, and the one most commonly seen, is confined chiefly to the trigonal area and manifests itself by a hyperemic condition at this point. We may find a severer grade where the inflammation is distributed in localized patches over the various portions of the bladder-wall, and a still more severe grade is found where the whole surface of the bladder is involved.

*Diphtheritic Cystitis.*—In this form, in addition to the local or general inflammation, there is a whitish or blood-stained membrane formed in various places.

*Exfoliative Cystitis.*—This is quite a rare form, the severe inflammation being accompanied by exfoliation of a part or the whole of the mucous membrane, and in some cases portions of the muscular coat are also included.

**PATHOLOGICAL ANATOMY.**—As the mild grades of cystitis never cause death, we are not familiar with the microscopical changes of this form. The macroscopic appearance as viewed through the cystoscope is, however, very suggestive.

In the early stage of an acute cystitis the mucous membrane is red and congested, but is otherwise normal; later the changes are marked, the walls of the bladder becoming thickened and the mucous surface covered with pus, fibrin, and exfoliated epithelium. Small bleeding areas where the epithelium has become detached are often seen.

In the chronic process the pathological changes are still more extensive. The muscular and fibrous coats are greatly hypertrophied, and the actual cavity of the bladder is much decreased by the thickening and contraction of its walls. The rugæ stand out as prominent ridges and may assume a polypoid form.

Hemorrhage occurs into the mucous membrane, and appears as dark ecchymotic patches, which later change to slate-color as the extravasated blood is absorbed, leaving only the coloring matter in the tissues as a more or less permanent stain.

In the severe cases of diphtheritic cystitis the membrane is composed not only of necrotic mucous membrane, but at times the muscular coat is also included. It has been stated that portions of the peritoneal covering of the bladder have been included in these casts. Where there is such extensive inflammation of the bladder the surrounding organs are more or less involved through extension by continuity, and are closely adherent to one another.

In some cases the diphtheritic process becomes localized, and

deep erosions or ragged ulcers result. These ulcerated areas may only involve the mucous coat, or may extend deeper and attack the muscular coat, and in rare instances perforate the bladder-wall.

The urine is usually intensely alkaline and heavily laden with mucus and with urinary salts, especially the phosphatic. These salts are often deposited as fine incrustations on the ulcerated areas.

When voided the urine may be of a reddish, brownish, or milky color, and if allowed to stand for a few hours in a conical glass, a thick yellowish or reddish sediment settles to the bottom, while the top is clear, or if bacteria be present it is turbid. On examining such a specimen microscopically there will be found a large number of leucocytes and red blood-corpuscles, pavement epithelium, isolated or in clumps, and often large numbers of crystals of triple phosphates. If the urine has undergone fermentation either within or outside the bladder, myriads of actively motile bacteria will be seen.

The worst forms of diphtheritic cystitis may merge into gangrene and the whole bladder be involved in a putrid sloughing mass. Rokitsansky has described a peculiar ulcer of the bladder which he thinks is analogous to the round ulcer of the stomach.

As a result of the hypertrophic thickening of the bladder-walls the vesical orifices of the urethra may partially be occluded, and dilatation of the ureters, pyonephrosis, or hydronephrosis may occur.

**SYMPTOMS.**—In no condition is the pain more agonizing than in an acute or ulcerative cystitis. The pain is usually most severe above and behind the pubes, radiating into the groin and down the thighs. If able to be about, the patient walks very slowly and the body is slightly inclined forward; if in bed, the legs are usually flexed upon the abdomen, as the slightest jar or tension of the abdominal muscles increases the pain. The desire to void the urine is constant, and the act is attended with sharp lancinating pains, which decrease after the urine is voided. A few drops of blood may be ejected with the urine. There is usually over the pubes constant dull pain, which increases as the bladder is distended with urine.

Pressure over the pubes causes great pain, and at times the tenderness in the region is so marked that even the weight of the bed-clothing cannot be borne. Following urination there is usually a sensation as though a few drops of urine yet remained, which gives rise to constant bearing-down pains. These pains may be so urgent as to cause the patient to remain for hours on the chamber, and may



cause her to scream out with agony. There is often dull pain in the perineum, and occasionally a patient describes peculiar sensations about the umbilicus.

Increased frequency of micturition is an invariable symptom in cystitis, in acute cases the desire being constant; in milder cases less frequent, but always urgent.

Hematuria is frequent in the early stage of the inflammation, and at times there may be little else than pure blood voided. As the process becomes older the blood in the urine diminishes, and may entirely disappear. The appearance of the urine, which has been described above, is also characteristic. In acute or ulcerative cystitis defecation may be painful and menstruation is often deranged. In acute cases the attack is ushered in by a rigor, followed by a slight increase in temperature and sharp pain in the region of the bladder. If of the milder type of cystitis, a few days suffice to free the patient from all discomfort.

In the more severe septic or diphtheritic cases the symptoms from the onset indicate a very grave condition. The temperature ranges between 101° and 103° F.; the rigors are severe and occur at intervals for days; the tongue becomes dry, glazed, and coated, and may be fissured; there are headache and vomiting, and occasionally delirium. Micturition is difficult and excessively painful, and may be impossible on account of the occlusion of the ureteral orifice with false membrane. If the bladder is catheterized, only a small amount of urine can be drawn without cleansing the catheter of shreds of membrane.

The bladder may become greatly distended on account of retention. The urine has an excessively fetid odor and is of a brownish or reddish color. Large pieces of membrane, and at times a complete cast of the interior of the bladder, may be expelled through the urethra.

The patient sinks into a typhoid state; the pulse becomes rapid, running, and feeble; the temperature gradually rises during the day, reaching its highest point in the evening; there may be carphologia and subsultus, and she finally goes into profound collapse and dies.

As the kidneys are often much hindered in their action because of the vesical disorder, there may be total suppression of urine, followed by uremia, from which she dies.

DIAGNOSIS.—The dull heavy pain over the pubes, the sharp lancing pain during micturition, and the frequent desire to void the



urine, are all subjective symptoms strongly suggestive of cystitis. An examination of the urine is also of help, the recently voided specimen appearing turbid or blood-tinged, and on standing a thick whitish-yellow sediment forms at the bottom of the vessel, which may be pinkish in color if blood is present.

The reaction is sometimes acid and sometimes alkaline, so nothing can be based on this point. If alkaline, the urine is apt to have a very strong fetid odor.

The microscopical examination shows the field filled with pus-corpuscles singly and in clumps, red blood-cells, and pavement epithelium.

The diagnosis can in every case be made certain by the use of the cystoscope. In acute cases where there is much pain and tenesmus an anesthetic will be necessary.

**PROGNOSIS.**—The prognosis in the milder grades of cystitis, as in the cases following pregnancy or a serious operation, is usually good, the cystitis disappearing under appropriate treatment in a short time. In the severer grades the prognosis becomes more serious, though many of these cases are finally cured.

Chronic cystitis is always intractable, and may last for years even under the most skilful treatment.

**TREATMENT.**—With our present knowledge of the causes of cystitis the prophylactic treatment is of importance, and this is especially the case in hospital practice, where patients often require catheterization.

A rule should be made that every patient have a separate catheter, which is kept in an antiseptic solution and disinfected after each using.

Before each catheterization the external genitals are carefully washed with a solution of boric acid, especial attention being paid to the urethral orifice. The labia are then separated with the thumb and fore finger of one hand, taking care not to touch the parts near the urethra, and the sterile catheter inserted, not allowing it to touch any portion of the vulva before introduction.

The first requisite in the curative treatment of cystitis is rest, and to accomplish this the patient must at once go to bed and lie in the recumbent position. All stimulating foods, such as meats, highly-seasoned dishes, alcoholic beverages, especially those containing a large percentage of alcohol, should be avoided. It is best to restrict the diet to milk or light broths. Saline cathartics should be admin-

istered, and later care must be used to keep the lower bowel free from fecal accumulation. Warm enemata are useful, not only as a means of evacuating the bowel, but also as a soothing agent. Hot sitz-baths usually relieve the tenesmus and vesical fullness. If the pain is severe, an enema of 30 drops of tincture of opium in 2 ounces of starch-water may be employed, or opium may be given in suppository. Sometimes an iodoform or belladonna suppository will relieve the pain. Hot compresses should be applied over the bladder. Cups applied to the sacrum are often useful in relieving tenesmus and the sensation of fullness.

To allay the fever and keep the urine bland and unirritating the following prescription will prove of value :

R. Tinct. aconiti,	fʒj ;
Spirit. æther. nitrosi,	fʒij ;
Liquor potassii citratis,	q. s. ad fʒvj.—M.

Sig. A dessertspoonful every four hours.

Benzoate of ammonia, in the dose of gr. x every two hours, has been highly recommended.

In acute cases which are of septic origin irrigations of the bladder should at once be instituted, as the removal of the infecting agent is of prime importance.

The solutions used in washing out the bladder are numerous, but those which have been of greatest value are boracic acid (50 per cent. to saturated solution), weak solutions of permanganate of potash, bichloride of mercury (1 : 100,000, gradually increasing in strength), and silver nitrate (1 : 4 gr. to the ounce).

The following is the best manner for irrigating the bladder : A glass catheter should be attached to an ordinary or fountain syringe by means of a rubber tubing or small soft-rubber catheter. The temperature of the water should be 100° to 105° F. The same precautions in cleansing the external genitals should be observed in irrigations as in catheterization. The patient lies in a recumbent position with the hips slightly elevated, resting on a bed-pan. The solution is allowed to flow before introduction of the catheter, when the rubber tube is pinched up, thus preventing the introduction of air into the bladder. A sufficient quantity of the solution is permitted to flow into the bladder until slight distension is produced or the patient complains of pain. The fluid is allowed to remain for a few seconds, when it is withdrawn by detaching the rubber

tubing from the catheter. The irrigations should be repeated until the fluid flows away clear. At first the patient will probably not be able to stand more than one irrigation daily, but after one or two days she becomes accustomed to the treatment, and if the case is badly infected, the bladder can be washed out thrice daily. Boracic acid is always the best solution to commence with, as it is free from danger and is less irritating than bichloride of mercury or silver nitrate. Repeated hot vaginal douches are very beneficial.

Where the cystitis is localized in patches the improvement will often be hastened by applications once in five days or once a week of a 3, 5, or even 10 per cent. solution of nitrate of silver, this application being made through the cystoscope directly upon the affected area.

The treatment of chronic cystitis differs in many respects from that of the acute inflammation. The mucous membrane of the bladder, instead of being functionally over-active as in the acute form, is depraved and its function largely destroyed by the chronic inflammation. For this reason stimulating injections and internal remedies must be employed with the hope of bringing into activity the depraved mucous membrane. It is in these cases that the solutions of bichloride of mercury and silver nitrate will be of greatest service. More than two irrigations daily with these solutions should never be given. If the pain after the employment of silver nitrate is excessive, a 5 per cent. salt solution may be injected, which precipitates the silver nitrate in the form of an unirritating chloride of silver.

If, as in many cases, the treatment fails and the pathological process grows worse, it may be necessary to secure constant drainage of the bladder by means of dilatation of the urethra, by vesico-vaginal fistula, or by the use of a self-retaining catheter.

Dilatation of the urethra may relieve the tenesmus and secure drainage for a short time, but at best is but a temporary measure, and must be repeated a number of times if it is to be of value; for this reason it is not, as a rule, practicable. It may be accomplished either gradually by the use of a hard-rubber graduated bougie or rapidly by the aid of Goodell's small uterine dilator. The danger of urinary incontinence must always be borne in mind, as over-dilatation may result in permanent incontinence. The use of a self-retaining catheter is only to be employed when operative measures are refused.

The best plan is drainage through a vesico-vaginal fistula. Emmet advises the opening to be made as follows: "The patient is etherized and placed in the Sims position, and the perineum well retracted; a sharply-curved sound is passed into the bladder and its beak pressed against the septum, so as to protrude in the median line a short distance behind the vesical orifice: it is then cut down upon by the aid of tenaculum and scissors. The blunt blade of the latter is inserted through the opening into the bladder, and the incision prolonged 3 or 4 cm. in the direction of the cervix uteri. Care must be taken that the blade of the scissors really enters the bladder, since it is apt to penetrate the loose cellular tissue between the vesical and vaginal membranes, and thus the latter only is incised. The edges of the vesical and vaginal membranes should then be united by a continuous suture to prevent the fistula from closing. Any troublesome hemorrhage at the time of operation may at once be arrested by passing a deep transverse ligature through the upper or lower angle of the incision, according to the direction from which the blood comes; any such measure will, however, rarely be demanded."

The actual cautery may be used in making the fistula. After the opening is established the vagina should be douched at least twice daily with boracic-acid solution, and all parts with which the urine may come in contact must be anointed with cold cream or vaseline.

The bladder may be irrigated as before, allowing the fluid to flow through the fistula into a bed-pan. As the fistula must be kept patulous until the cystitis is cured, which may require months, it will be necessary to have the patient wear some form of ambulatory urinal, which can be obtained at any instrument-maker's. After all symptoms have disappeared the fistula can be closed in the manner described in the article on that subject.

*Tubercular Cystitis.*—Tuberculosis of the bladder is usually secondary to renal tuberculosis, though sometimes a primary tuberculosis in this organ is seen, being in such a case evidently a blood-infection from a primary focus in another part of the body.

**PATHOLOGICAL ANATOMY.**—As in tuberculosis elsewhere, at first there is the formation of minute tubercles in the mucous membrane; these tend to coalesce, and then, as in other parts of the body, they break down and form ulcers, which may be of small size or which may cover a large portion of the bladder-wall.

**SYMPTOMS.**—In the early stages the symptoms are those of a rather mild cystitis, but as the condition gets worse the symptoms increase markedly in severity, and will soon break the patient down from the constant pain and loss of rest.

**DIAGNOSIS.**—As the symptoms of tuberculosis closely simulate those of chronic cystitis, it is often difficult or impossible to differentiate the two conditions. In all cases of cystitis coming on insidiously and without apparent cause tuberculosis may be suspected, and a careful examination of the lungs should be made to discover if they are the seat of primary infection. Having excluded the lungs, the kidneys should be examined carefully. It is in these cases that the ureteral catheters are of great value. The method of catheterization of the ureters, as described in the article on that subject, should be followed. The specimens of urine obtained by this means should be examined for tubercle bacilli.

*The Demonstration of Tubercle Bacilli in the Urine.*—The sediment from the suspected urine is obtained from the bottom of a conical glass after the urine has stood for some time, or better still, by centrifugalization. Drops of this are spread out in a thin layer on several cover-slips, as in the examination of sputum, or, as the bacilli are often few in number and it is desirable to examine a large surface, some of the sediment may be spread out on an ordinary microscope slide; after being spread the film is allowed to dry in the air, and the cover-glass or glass slide afterward passed quickly three times through the flame of a Bunsen burner or an alcohol lamp. Care must be taken not to overheat the specimen; this may be avoided, as a rule, by holding the cover-slip between the fingers while passing it through the flame.

The best method of staining for general use is that of Gabbett, a modification of the Ziehl-Neelson method. A few drops of the following solution—

Fuchsin, pure,	1,
Acid. carbolic.,	5,
Alcohol, absolute,	10,
Aquæ destillat.,	100,

are poured on the cover-glass, which is then held in fine forceps over the flame, and heated to boiling for from one-half to one minute; the excess of stain is washed off with water, and the



cover-slip immersed for a moment or two in a combined decolorizing fluid and counter-stain (sulphuric acid pure 1, distilled water 3, methylene blue to saturation).

The specimen is immediately washed off in water, and if insufficiently decolorized, again immersed in the decolorizing fluid. After washing in water, the cover-glass is placed between two folds of good filter-paper to remove the excess of water; the glass is thoroughly dried high above the flame, and finally mounted in a drop of xylol balsam.

A good oil-immersion lens ( $\frac{1}{12}$  or  $\frac{1}{14}$ ) is required for the examination. Sometimes the bacilli are numerous, but in many cases there are very few, and it may be necessary to look carefully through many preparations before finding them.

It is also necessary to warn against the possibility of confusing the tubercle bacillus with the smegma bacillus, which has the same staining qualities, and which is found in the urethra and external genitals. The urine to be examined should therefore always be a catheterized specimen, as by using the catheter the urine does not touch the area in which the smegma bacillus is found.

In the early stage the cystoscope may reveal the miliary nodules or the localized caseous area, or later the tuberculous ulcers may be seen, and thus the extent of the process determined. If tubercle bacilli be found in the urine, and other organs are not the seat of primary infection, the diagnosis is definite; but frequently a cystitis which seems to be the result of a localized tuberculosis will prove upon catheterization of the ureters to be an extension from the kidneys.

**TREATMENT.**—If the infection of the bladder be primary, the tuberculous areas should be treated by the injection of medicated solutions, or the application locally of medicinal substances, as nitrate of silver or lactic acid. Cystotomy and curettement may sometimes be used with good results. The bladder should be opened in the manner described in the article on Cystitis, and it is best to allow the vesical fistula to remain open, as free drainage is afforded by this means. Besides these local measures, the condition should be combated by attention to the general health, and good results often follow the use of creasote, and cod-liver oil, with a generous diet and, if possible, an open-air life.



## TUMORS OF THE BLADDER.

Tumors of the bladder are either primary, taking origin from one of the layers in the bladder-wall, or secondary, the vesical growth being either a direct extension by contiguity from a neoplasm in any of the neighboring organs, as the uterus, urethra, etc., or in rare instances metastasis may occur here.

As primary tumors are the ones of importance to the surgeon, we will only attempt to describe this variety.

In studying the primary tumors of the bladder, Kuester's classification, depending on the point of origin from the various layers composing the bladder-wall, will be followed. According to Kuester, the various tumors which are found in the bladder arise—

(1) From the mucosa or submucosa; (2) from the muscular coat; (3) from the epithelium.

Tumors arising from the mucosa and submucosa are the most frequent, and are usually benign in character.

Unfortunately, the difficulty of obtaining a clear idea of the neoplasms of the bladder is much enhanced by the various names which have been given to the same variety of tumor.

This is well illustrated in the number of names which have been bestowed upon the benign papillary growth, which is the most common tumor seen; for instance, Virchow spoke of the growth as a "fibroma papillare," Kraemer as a "papilloma," Thompson as a "fibro-papilloma," and Kuester as a "zotten polyp."

This tumor histologically is made up of a branched connective-tissue foundation, which arises immediately from the connective tissue of the submucosa, and through which course a network of blood-vessels, each prolongation of the connective tissue having its accompanying artery. The surface is covered by several layers of regularly arranged epithelial cells which are continuous with the epithelial covering of the bladder-wall.

These growths usually have a pedicle which may be very short and broad, or may be long and rather thin; in form they may be either rounded, with something the appearance of a raspberry, or, on the other hand, they may be of a very soft consistence, with long feathery prolongations.

There is another variety of benign growth taking origin from the submucosa, and appearing as a rounded, rather hard growth, always arising by a pedicle and never showing any tendency to papillary excrescences.

Histologically, this approaches more the type of a pure fibroma, the connective tissue being more or less concentrically arranged, and without the prolongations which are seen in the papillary form.

The surface is covered by several layers of epithelial cells arranged in order and continuous with the bladder epithelium. These tumors may be the seat of myxomatous degeneration, and they are then known as fibro-myxomas.

*Sarcoma* of the bladder is one of the rarest forms of tumor seen here. It usually appears as a flat, fleshy growth extending over the bladder and infiltrating its walls, or, again, it may be found growing from a pedicle, which is in some cases small and narrow, allowing the tumor to appear through the urethral opening. Histologically, the tumor takes either the form of a round-celled or spindle-celled sarcoma, and is very rapid in its growth.

*Tumors arising from the Muscularis.*—These tumors are always made up of bands of involuntary muscle-fibres, and of a framework of connective tissue, in which the blood-vessels run. They are usually firm in consistence, and are either pedunculated or arise from a flat base. They may also be multiple, though more commonly only one large tumor is found. Rarely, too, instead of growing into the bladder-cavity, they project externally beneath the peritoneum, forming extra-vesical tumors.

*Tumors taking Origin from the Epithelium.*—Carcinoma is the most common form of malignant tumor that we see, and it may appear either as the hard scirrhus form, extending over the surface of the bladder as slightly raised nodular growths, which infiltrate slowly and are of the epitheliomatous type, or of the softer alveolar type, these tumors projecting more into the lumen of the bladder and infiltrating more quickly the bladder-walls, and having a more marked tendency to ulceration, than the scirrhus form. Both of these forms may also show a tendency to the formation of papillary excrescences, and undoubtedly in a certain number of cases there is a tendency to secondary carcinomatous degeneration in the formerly benign growth.

Adenomata have also been described, but are of very rare occurrence.

Paget has also described a case of dermoid cyst of the bladder, but in most of the so-called dermoid cysts the diagnosis has been made by the passage of hair or teeth from the bladder, these prob-

ably coming originally from a dermoid of some other organ which had ruptured secondarily into the bladder.

**ETIOLOGY.**—The causes of both the benign and malignant tumors are unknown, save that the irritation of a prolonged or severe cystitis is thought by some to be a cause of proliferative changes and the formation of papillary outgrowths.

The sex of the patient has some influence, women being less apt to be affected by new growths of the bladder than men.

The age also exerts influence, carcinoma being usually a disease of late adult life, and papillary growths are also apt to occur late in life, while sarcoma, on the other hand, is present at any age.

**SYMPTOMS.**—There is in every case of bladder tumor a certain period called the first stage, during which time there are no symptoms complained of, and this has been aptly named the “latent period,” the onset symptom marking really the beginning of the second stage, and not the “birth” of the tumor.

The latent period is usually terminated abruptly by hemorrhage, which is most commonly the onset symptom of the second stage; and there seems some difference to be noted in the character of this hemorrhage, that accompanying the benign neoplasms usually starting without any known cause, and appearing as a few drops of blood at the end of micturition, or the appearance of rose-colored urine occasionally; while the hemorrhage from a surface epithelioma is apt to follow for the first time severe exertion or a rough ride, and is apt to be more profuse. The hematuria in both cases is painless and unaccompanied by vesical irritability, and in both cases is apt to be intermittent.

Another symptom is the sudden blocking of the urethra during micturition by the new growth and the stopping of the flow of urine, with straining and some vesical tenesmus.

The onset in the rapidly infiltrating cases differs from the benign and the surface epitheliomata as beginning with vesical irritability, which is soon complicated by the presence of blood and pus in the urine and the symptoms of a severe cystitis.

The later stages in both the benign and malignant cases begins by the appearance of cystitis, which in the benign tumors may be delayed for years, but when it has once begun the patient begins to go down hill rapidly, and, because of the liability to renal complications, the operation for the removal of the growth has a much less hopeful outlook.

Another symptom which when present is almost pathognomonic is the presence in the urine of pieces of the new growth, though from these pieces, unless large and retaining all of their characteristics, it is almost impossible to determine the variety of the growth.

Pain in the vesical region is a very uncertain symptom, and if present is usually the result of cystitis. Pain has, however, been described as located at the external urethral orifice and in perineum and rectum, and not dependent on the presence of cystitis.

**DIAGNOSIS.**—The presence of intermittent painless hematuria, especially if complicated by the sudden stoppage of the flow of urine, should always excite suspicion in patients over thirty years of age, and a careful examination should be made to determine the seat and cause of the hemorrhage.

A careful examination of the urine should be made to exclude renal disease, and the fresh color of the blood and its appearance at the end of micturition will be of help in the diagnosis.

The direct examination by palpation is also of value, especially where the growth is somewhat hard and resisting.

The bladder should be emptied, better by the patient herself than by the use of the catheter. Two fingers are introduced into the vagina, and then, with the other hand pressing directly over the bladder behind the symphysis, the walls of the bladder may be easily palpated throughout almost their whole extent by the vaginal fingers, which should touch carefully and slowly the whole of the bladder within reach.

The use of the sound seems rather a dangerous means of examination, and should only be attempted where other means have failed.

Our most important method of diagnosis is, however, the cystoscope, as by its use the whole of the bladder-wall may be visually examined, the character of the new growth made out, and the possibility of operative help determined. The cystoscope should in these cases be used very carefully, as hemorrhage may follow any rough movement, obscuring the field and preventing accurate examination.

**TREATMENT.**—There is only one method of treating new growths of the bladder, and that is by operation; but there are several points to be decided before an operation is attempted—namely, the extent and character of the growth, the presence of cystitis, as this will lessen greatly the chances of a favorable issue, and also the general

condition of the patient and whether she will be able to stand a serious operation.

An operation having been decided on, there are three avenues by which the bladder may be reached: through the urethra, through the vagina, and through a suprapubic opening.

The female urethra may be dilated enough to allow of the introduction of a No. 15 or 16 mm. speculum, and through this a papillary growth, if arising from a pedicle, may be removed by the snare or by a curette, but beyond this the urethra gives too little room to allow of the careful removal which is so necessary in a malignant growth.

Removal through an opening made into the bladder through the vaginal wall is open to the same objection—want of room and inability to control perfectly the field of operation.

The route which gives us the best chance of success, then, is the suprapubic, as here, if we cannot obtain all the room we want, the field of operation is at least directly under our eyes, and we can control the steps of the operation much more easily.

The patient, after having had the pubes and mons veneris carefully shaved and cleaned, is placed in the Trendelenburg position. The incision may be either a transverse one, just above the symphysis, or an incision perpendicular to the symphysis in the median line.

A male catheter is introduced into the bladder, and after the incision has passed through the thick subcutaneous fat, the muscular layers, and the prevesical fat, the bladder may be recognized by raising it up on the end of the catheter. The bladder is then caught and opened, and the two free edges held by forceps or silk sutures which are passed through them. The neoplasm is searched for, being careful that no rough movements are made, as, if the growth is wounded before the relations are carefully studied, blood will so obscure the field as to make the examination and the subsequent operation much more difficult. If the tumor has a pedicle, this is divided with the scissors or a fine-pointed thermo-cautery, the hemorrhage being stopped, if possible, by the use of the cautery; or fine catgut ligatures may be passed under the stump. Great care must be exercised that in passing ligatures the ureter is not included, and, in fact, the relations of the ureters must be borne in mind during the whole operation. To bring the field of operation better into view, an assistant may introduce a finger or two into the vagina and press the bladder forward.



The treatment of hemorrhage is an important question, and is apt to give trouble. To control it the thermo-cautery may first be used; if this does not do, fine catgut sutures may be passed through the mucosa and deeper tissues. If, however, the hemorrhage is severe, we cannot waste time, and it is most easily and quickly controlled by tamponing the bladder, a firm tampon being also introduced into the vagina.

Fenwick advises operating through a "caisson" introduced through the suprapubic incision and pressed down over the diseased area. A Fergusson tubular speculum may be used in the same way.

The bladder-wound is to be closed by a layer of fine sutures so introduced as not to pierce the mucous membrane. The remainder of the wound had best be left open, merely packing it loosely with gauze and allowing it to heal by granulation. If the bladder has been tamponed, the ends of the tampons are brought out through a portion of the bladder-wound left unclosed, and this tampon must be removed in from twenty-four to thirty-six hours, another one being inserted if the hemorrhage still continues. A catheter must be left in the bladder for the first few days. No irrigation is necessary unless there is a marked cystitis or an infection following the operation; in either case the sutures in the bladder-wall will probably break down, and the bladder must then be irrigated two or three times during the twenty-four hours.

The operation which is done must be controlled by the circumstances of the case—whether a beginning new growth may be cutretted away or whether a piece of the bladder-wall must be excised. Also the removal of the whole bladder has been practised, with fairly good results, but every surgeon will realize what it means to undertake such an operation, and that unless it is carried through successfully the condition of the patient will be worse afterward than before.

The palliative treatment of non-operative cases also offers the chance of relieving our patients of much at least of their suffering, and should always be carefully attended to. The vesical tenesmus and constant desire to void the urine may be relieved by making a vesico-vaginal fistula, and daily irrigations of the bladder are useful unless they cause increased hemorrhage. The hemorrhage is a hard symptom to control, and in many cases all attempts are useless. Injections of ice-water into the bladder or the use of ice-bags over the pubes may be tried, as also the use of astringent injections or the internal administration of ergot.



The pain can be relieved by the use of narcotics, opium usually acting well in these cases in the form of suppositories.

#### DISEASES OF THE URETERS.

Diseases of the ureters are becoming daily of more importance to the surgeon as the means of diagnosis and the methods of treatment are improved.

*Anomalies of the Ureter.*—As the ureter is formed by a diverticulum from the Wolffian duct, which, dividing at its free end, forms the calyces of the kidney, it is easy to see how, by a division taking place too soon, an anomalous ureter might be formed.

The commonest anomaly seen is a partial duplication of the ureter near the renal hilus, the two tubes coalescing below to form the single ureter, and above at the kidney, either forming two distinct pelves or opening into one pelvis. A higher grade of duplication is seen where the two ureters, arising by separate pelves, run separately through, side by side, nearly to the bladder before uniting. A complete duplication is also seen where the ureters run their entire course separately, one portion either entering by a blind sac in the bladder-wall, and thus causing a partial hydronephrosis of one kidney, or opening into the urethra or rectum; rarely both ureters opening directly into the bladder by normal orifices.

Most of these conditions are not recognized until seen at the autopsy table or in the dissecting-room, and therefore give rise to no symptoms and require no treatment.

The cases of abnormal opening of one ureter into the vagina or urethra or somewhere on the vestibule give rise to annoying symptoms from the constant flow from them of urine.

*TREATMENT.*—A urinal may be worn to collect the urine and prevent the constant wetting of the genitals and linen, and the unpleasant odor which always clings to these patients; or an operation may be attempted, the ureter being dissected loose and turned into the bladder; or a fistula may be formed between the ureter on one side and the bladder on the other, the edges of the two being sewed together with a fine needle and silk sutures.

*Trauma of the Ureter.*—This subject until of recent date was of comparatively little importance, as so few cases occurred. Since, however, the recent advances in abdominal surgery the ureter is often wounded in removing long pelvic tumors or inflammatory masses, and the methods of treatment are therefore of importance.

The wounds of the ureter may be divided into two classes: the accidental wounds and the wounds occurring during the course of a surgical operation.

The first are of rare occurrence, and may either be occasioned by crushes or other violence, without implication of the skin and external coverings of the body, or they may be occasioned by a stab or a gunshot wound.

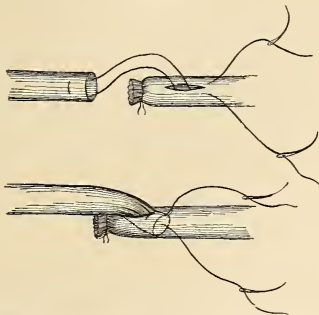
**SYMPTOMS.**—The subcutaneous wounds are difficult to diagnose, as the symptoms are very much like those of a kidney-wound, except there is usually no hematuria, and there is an extravasation of the urine into the tissues and the formation of an indistinct tumor.

Wounds occasioned by stabbing or shooting are diagnosed by the direction of the wound and the effusion of urine.

**TREATMENT.**—Where the diagnosis is made the treatment is anastomosis of the severed ends.

Wounds of the ureter occurring during surgical operations are frequent, and are especially apt to be seen by the gynecological surgeon, occurring during removal of large fibroid tumors of the uterus, carcinoma of the uterus, intra-ligamentary tumors, or pelvic inflammatory disease.

FIG. 338.



Uretero-ureteral Anastomosis: bladder end of the ureter ligated. Stitches in place, ready for tying.

The diagnosis is usually made by seeing the clear urine welling from the cut ureter.

The wounds which may occur are divided into—(1) a simple wound, without complete solution of the continuity; (2) a complete division of the ureter, but without displacement of the extremities; (3) a complete division of the ureter, with wounding of the ends.

**TREATMENT.**—This is divided into the methods which have for their object a restitution of the ureter, and those by which a complete extinction of the urinary function of the affected side is intended.

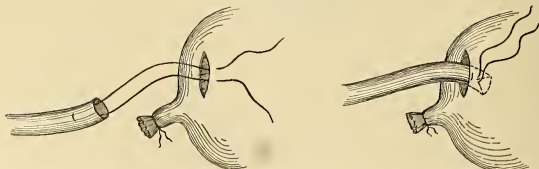
The methods of effecting the restitution of the function are different, depending on the character of the wound, its position, and the amount of ureteral tissue which is lost.

For instance, where the ureter is only partly cut through the wound may be closed by fine silk sutures, care being taken that the sutures do not enter the lumen.

In cases where the ureter is cut entirely across, some method of anastomosis of the two ends is used. By Van Hook's method the lower end is closed and an incision is made in the wall of this portion of the ureter just below the closed end; into this the upper end of the ureter is introduced and kept in place, partly by a catgut suture, which is first introduced through the upper end, and then both ends of the suture threaded on separate needles are carried through the wall of the lower end of the ureter, the needles being passed from within outward, and the ends tied outside. Several fine sutures can also be passed through the edge of the incision in the lower end and through a corresponding portion of the wall of the invaginated upper end, thus holding it more firmly in position.

An end-to-end anastomosis has been attempted, and has been followed by good results, though there is a tendency to contraction of the scar and stricture-formation. This anastomosis may either be made with the two ends cut squarely across, or the two ends may be cut obliquely, thus giving a larger scar and lessening the danger of subsequent stricture.

FIG. 339.



Bladder Implantation. Bladder end of ureter ligated; incision in bladder; stitches in place ready for tying.

The sutures in these cases had best be of very fine silk and so introduced as not to encroach on the lumen. The method is unsafe in view of the certainty of success by lateral anastomosis or bladder

implantation. A direct implantation of the ureter into the bladder has been done a number of times with success where the anastomosis method was impossible, though the uretero-ureteral anastomosis is the better method if it can be carried out.

By the bladder-implantation method the bladder end of the ureter is ligated and dropped. The bladder is then opened at the point nearest to which the end of the ureter is most easily approximated.

After freeing the ureter and opening the bladder, both ends of a suture (each end threaded with a separate needle) are passed through the wall of the ureter and brought out of the end of the vessel. The needles are immediately passed into the bladder through the opening, are made to penetrate its walls about a quarter of an inch from the cut margin, and are brought out upon its peritoneal surface, where the two ends are securely tied, thus drawing the end of the ureter into the bladder and there fixing it. If thought desirable, two such sutures may be passed. Catgut must be used for this purpose, for the reason that by its swelling it obviates any danger which might exist as to leakage of urine from the puncture points (which is exceedingly remote), and for the reason that silk might and probably would act subsequently as a predisposing factor for the formation of vesical calculus.

It is probable that the sutures may draw the free end of the ureter so close to the bladder-wall as to interfere with the free flow of the urine; therefore it is well to always split the ureter for a short distance on the side opposite to that on which the stitch is placed.

It now remains to close the opening into the bladder. A small catgut suture will securely unite the cut edges of the mucous membrane of the bladder, care being taken that it be brought snugly about the ureter. In fact, to the more surely secure this result a stitch may be carried through the wall of the ureter itself, care being taken not to penetrate its lumen. The connective tissue, alone or together with the peritoneum, is now to be approximated by a similar suture, the same precaution as to the ureter being again taken. If desired, silk may be used safely for this and subsequent parts of the procedure.

A ureteral fistula has also been made by implanting the cut end into the abdominal wound or into the vagina or rectum, but this is a dangerous method, and besides the annoyance of the fistula, there is great danger of pyonephrosis from an ascending infection.

Complete extinction of the urinary function of the affected side

may be effected either by ligation of the ureter or by a nephrectomy, but with the present advances in the surgery of the ureter the necessity for this method of dealing with a wounded ureter will rarely or never occur.

#### INFLAMMATION OF THE URETER; URETERITIS AND PERIURETERITIS.

Inflammation of the ureter is almost always consecutive to inflammation either of the bladder or of the kidney, and may be distinguished as ascending ureteritis or descending ureteritis as the infection comes from above or below.

Another division may be made between the cases with dilatation and those without dilatation of the lumen of the ureteral canal.

**ETIOLOGY.**—The most common variety of ureteritis is caused by an ascending infection from an acute or chronic cystitis. The predisposing cause, or, in other words, the reason why in some cases of cystitis ureteritis appears, while in others, apparently of equal severity, ureteritis is not present, cannot be easily explained.

Retention and stagnation of the urine in the bladder is apparently one cause, as are also the violent vesical contractions which accompany so many cases of cystitis, the contractions forcing the urine backward into the ureter. Inflammatory disease of any of the pelvic organs, causing pelvic congestion, is also probably a cause.

The descending ureteritis is merely a direct extension of the inflammation of the pelvis from the kidney, and is rarer than the ascending variety.

**PATHOLOGICAL ANATOMY.**—We must differentiate between the acute and the chronic forms, though clinically this is hard to do. The acute form shows swelling and reddening of the mucous membrane, and with the microscope there is seen to be some loss of the surface epithelium, infiltration of the mucosa and submucosa with leucocytes, and congestion of the vessels.

The chronic ureteritis takes two forms, according to whether there is dilatation or whether the tube is thickened and not dilated, and fixed in position by periureteral inflammation.

The ureter in the dilated form is lengthened, tortuous, with thin transparent walls, looking at times like the small intestine. Under the microscope the walls in most places are found thin, the mucosa represented by either a thin line of flattened epithelium, or the epi-



thelium is entirely wanting, the muscular coat being represented by a few fibres and the principal thickness of the wall formed by connective tissue.

In places there are found thickenings in the wall representing the strictured places, the thickened spots being formed of connective tissue.

In ureteritis without dilatation the ureter forms a thickened cord retained in place by a periureteral inflammation. The lumen in these cases is lessened by increase of connective tissue in the walls, and the elasticity has almost entirely disappeared, and in places there will be found strictures almost entirely destroying the lumen.

**SYMPTOMS.**—The symptoms of ureteritis are usually so overshadowed by the symptoms of the accompanying disease elsewhere that they are not noticed.

Pain along the course of the ureter is common, and there is usually tenderness on pressure in the region on each side of the umbilicus, and on making a vaginal examination the ureter may be felt as a rounded, thickened cord in the broad ligament, where it has been mistaken for an ovary.

Pyuria is also present, as is troublesome bladder tenesmus, and frequent desire to pass urine, though these symptoms cannot be spoken of as belonging to the ureteritis, they being also present in pyelitis or cystitis.

**DIAGNOSIS.**—The onset of a ureteritis is usually insidious, and the symptoms for a time are not noticeable. The diagnosis depends on the character of the pain along the course of the ureter, the tenderness elicited by palpation through the abdominal walls, and the finding of the ureter enlarged or thickened in its pelvic course by a vaginal examination.

The introduction of a renal catheter will also give notice of the presence of strictures, both by the difficulty in passing and by the sudden flow of the dammed-back pus or urine after the stricture is passed.

**TREATMENT.**—The most important thing in the treatment is to relieve the immediate cause; thus, if the patient is suffering with a pyelitis, the proper treatment would be drainage of the pus sac. If the cause is a cystitis, the cure or relief of this must be attempted; the constant contractions of the irritated bladder must be lessened, either by using frequent irrigations or by the formation of a vesico-vaginal fistula.



The local application of astringent or antiseptic fluids may be made immediately to the diseased mucous membrane by the use of the renal catheter. The ureter is catheterized in the usual way, and with a funnel connected to the outer end of the catheter by rubber tubing the various medicinal agents, in solution, may be made to run into the ureter, and then, by merely lowering the funnel below the level of the kidney, may be siphoned out again. This is to be continued until the urine comes away clear.

The most useful remedies to use in this way are weak solutions of bichloride of mercury or nitrate of silver, the strength being gradually increased as the organ becomes more accustomed to the treatment.

Drugs such as salol, sodium biborate, sodium salicylate, and the various stimulating oleo-resins may be given by mouth for their effect on the urinary tract during elimination, and will often be found useful, especially in the milder cases.

*Tuberculosis of the Ureter.*—This condition, as in the ureteritis following infection with other pathogenic organisms, is, almost without exception, a secondary condition, though primary tubercular ureteritis has been described.

The SYMPTOMS are pain along the course of the ureter, which is much thickened and very tender, greatly increased frequency of micturition, and in some cases the passage of blood mixed with the purulent discharge.

The DIAGNOSIS from ureteritis following other infections can only be definitely decided by the examination of the purulent urine for tubercle bacilli, which, if found, will settle the diagnosis.

TREATMENT.—As tuberculosis of the ureter is most frequently a secondary result of tuberculosis of the kidney, the probability that in most cases of tubercular kidney the ureter and pelvis of the kidney are also tubercular should be an indication in every nephrectomy for the removal of as much as possible of the ureter.

#### OBSTRUCTION OF THE URETER.

The obstruction may be (1) by a foreign body lodged in the canal; (2) by changes in the wall of the ureter; (3) by pressure exerted on the ureter from the outside.

(1) *Foreign Bodies Blocking the Ureteral Canal.*—The most important and the most common bodies are renal calculi, which during their passage from the kidney become blocked somewhere along

the course of the ureter. Blood-clots or clots of inspissated pus may act in the same way, as may small daughter cysts in echinococcus disease of the kidney.

*Ureteral Calculi.*—Under this head can be classed only the stones which remain for some time in the ureter, leaving out all cases in which the stone passes through the ureter, even though slowly. These stones are usually about the size of a cherry-pit or larger, and with rough, uneven edges. Stones which have been in the ureter for a longer time usually have a characteristic ovoid form from the additional deposit of the urinary salts on the ends; they are also apt to show on one side a depression or groove through which the urine flows. The most common sites of impaction are just below the pelvis of the kidney and in the lower portion of the ureter just before its entrance into the bladder. More rarely they are found somewhere in the middle third.

The SYMPTOMS may come on acutely, and are then described as occurring in the following order, namely: at first a period during which the patient suffers from agonizing attacks of colicky pain due to the passage of the stone through a portion of the ureter. This ends sooner or later, and the second stage comes on, the pain lessening to a dull ache, and there is almost complete or a complete absence of the urinary flow. This absence of the urine may occur as a sympathetic condition where the other kidney, though healthy, does not secrete; or a more dangerous condition is present where the other kidney is badly diseased or absent, or where there are stones lodged in both ureters. A fluctuating tumor may be discovered in the renal region when there is complete stoppage of one ureter, this being one of the causes of acute hydronephrosis.

The symptoms may also run a chronic course, with attacks of dull pain somewhere along the course of the ureter, the patient often being able to locate exactly the seat of the pain. The urinary symptoms in these cases are usually absent, as, if there is complete cessation of the flow from one side, the other kidney will take up the work of both. There may, however, be seen a condition of "intermittent hydronephrosis" on the affected side, the stone being capable of some motion and acting as a ball valve.

DIAGNOSIS.—In the more acute cases the diagnosis is usually not difficult, as the history of an acute attack of pain, the dull pain located somewhere along the course of the ureter, and the partial or complete cessation of the urinary flow, all point to the condition

present. More important, however, is the condition of the other kidney, this only being determined by careful study of the individual case. The use of the renal catheter will be of great help in these cases, and by coating the tip lightly with dental wax the scratch-marks occasioned by contact with the stone can be seen.

In the cases where the onset is more insidious and the course chronic the diagnosis is difficult, especially if there is complete obstruction and no urine can pass the stone.

Here the diagnosis must rest on the previous history of renal colic, the dull aching pain localized usually in one spot, and the intermittent hydronephrosis which is present in some cases. The use of the renal catheter in these cases will give valuable results.

**TREATMENT.**—A stone having been diagnosed, the only method of treatment is the removal by operation, though diuretics and abdominal massage, with the hope of pushing the stone into the bladder, have been advised.

Two methods of reaching the ureter are open to us—namely, the transperitoneal and the extraperitoneal routes, and a third method, if the stone lies near the bladder, is through a vaginal opening.

The transperitoneal route allows the ureter to be examined more fully through a shorter incision, and the other kidney and ureter can be examined and the condition noted at the same time; but this method is more dangerous, unless the urine above the stone is perfectly aseptic, from the septic urine entering the peritoneal cavity.

If the transperitoneal route is chosen, the incision can be made either in the median line or external to this along the external border of the rectus.

In opening the ureter a longitudinal incision should be made, and after the stone is removed the incision is closed tightly with fine silk or catgut, the sutures being so introduced as not to enter the lumen of the canal.

The extraperitoneal route is safer, though it involves a longer incision, and it is sometimes difficult to find the ureter. The incision begins in the lumbar region just below the twelfth rib and about at the edge of the quadratus muscle, and from here a line is followed curving around the side of the abdomen, just above the iliac crest, to the anterior superior spine. The hilus of the kidney is first located, then the ureter, and by putting this slightly on the stretch it can be traced to where it enters the pelvis, and with the

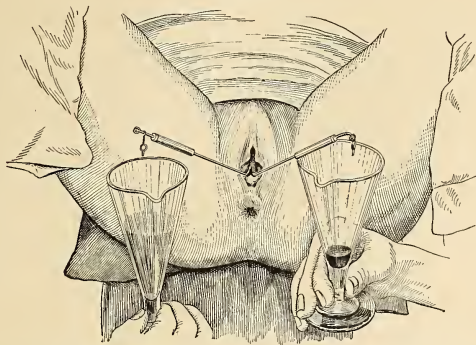
hand in the wound can be followed in its course until the broad ligament is reached. The method of opening and the closing of the ureter are the same here as in the transperitoneal method.

(2) *Changes in the Wall of the Ureter causing Obstruction.*—The most common changes seen here are the strictures of the ureter following inflammatory changes in its walls. These strictures may be single or multiple, and may be situated in any portion of the ureter.

The most common site is, however, near the ureteral opening into the bladder, and next to this the most common site for the stricture is near the junction of the ureter and pelvis of the kidney. The small cysts and the polypoid tumors are uncommon causes of obstruction.

**SYMPTOMS.**—In many of the cases the obstruction will give rise to no symptoms, this being especially true for the non-infected cases, though the symptoms of hydronephrosis from the slow accumulation

FIG. 340.



Catheterization of both Ureters: Left hand glass showing greatest quantity of urine secreted during a given interval; urine clear. Right hand glass showing a much smaller quantity of urine secreted; urine bloody, indicating the diseased kidney and the character of the disease.

of urine may be present. If the case is a septic one and the pus is prevented by the obstruction from emptying itself, there will be a history of pain, rise of temperature, and all the symptoms of purulent retention, with the presence in the flank of a tumor tender on pressure and slowly increasing in size.

**DIAGNOSIS.**—In the slow, insidious non-infected cases the only means of diagnosis is the renal catheter, by the use of which we can

locate the stricture, introducing it slowly and noting when there is a sudden outflow of urine, indicating that the stricture is passed. The amount of urine which is then collected should be saved, as indicating the amount of retention. In the infected cases the diagnosis will not be so difficult, the history of the patient, the presence of the tumor, and the pus withdrawn by the catheter, all showing the nature of the lesion.

**TREATMENT.**—A stricture low down near the ureteral orifice can be dilated by the use of a metal catheter, the size of the one used being slowly increased, or metal bougies may be used in the same way.

A stricture in the middle portion of the ureter may be dilated in the same manner by using the flexible-silk renal catheters. Strictures or kinks in the ureter near the pelvis of the kidney have been relieved by operation, either excising the strictured portion and performing a uretero-ureteral anastomosis or by a plastic operation. In the purulent cases the accumulation of pus must be removed and the inflammation combated in addition to the dilatation of the stricture.

(3) *Obstruction of the Ureter by Pressure from the Outside.*—

In women the most common cause of obstruction is from new growths or inflammation of the genital tract, there being, for example, in carcinoma of the uterus with extension laterally a large percentage of cases where there is almost complete obstruction to the outflow of urine, many of the patients suffering with carcinoma of the uterus dying from uremia. The ureter may also be blocked by pressure from a band of adhesion crossing it, and there are cases described where a congenitally misplaced vessel crosses and obstructs the ureter.

**SYMPTOMS.**—These cases, unless there is infection and very marked symptoms, are usually entirely obscured by the accompanying disease, not being discovered until either an operation is attempted for the pelvic disease or the patient dies and comes to the autopsy table.

**TREATMENT.**—As the cause is external to the ureter, the only method of treatment is by removal of this cause. Carcinoma which has developed enough to exert pressure is usually hopeless, and the only method of treatment is either by an operation to implant the ureters into the vagina or rectum or bring them out of the abdomen through an abdominal wound. As this will prolong life but a few



months, and is attended by all the discomforts of urinary fistula, in most cases at least it would seem to be contraindicated. Where the pressure is exerted by a pelvic abscess, severe pelvic adhesions, or by a large myoma, operation and the removal of the cause will relieve the ureteral condition.

#### NEW GROWTHS OF THE URETER.

Primary growths of the ureter are very rare, with the exception of the small polypoid tumors which are occasionally found in the pelvis of the kidney and upper portion of the ureter, and which usually give rise to no symptoms, though if they are large there may be hemorrhage from them, simulating a malignant growth of the kidney.

One case of sarcoma of the ureter has been reported which was operated on for a renal tumor.

Small cysts of the ureter are not uncommon, and are supposed by some to be the result of a folding in and adhesion of the mucous membrane following inflammation; by others they are considered to be due to the presence here of a sporozoa. They give rise to no symptoms, and are only of pathological interest.

Secondary new growths of the ureter are not so uncommon, they either extending from a renal tumor, or in the lower portion the ureter may be affected from a primary growth in the bladder or the genital organs.



## AFTER-TREATMENT IN GYNECOLOGICAL OPERATIONS.

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### ABDOMINAL AND VAGINAL SECTION.

THE importance of this whole subject is realized by every surgeon engaged in the practice of gynecological operations, and the want of some convenient literature to which reference may be made has often been deplored.

There are certain well-defined principles which may be followed in conducting the after-treatment of a patient upon whom an abdominal section has been performed, but concerning the details of any given case, the surgeon must be governed in great measure by the conditions as they arise. These conditions may best be met and overcome by carrying out the principles to be enunciated, and by deviating from them only when an emergency arises; even then keeping well in view the general objects to be obtained.

*Rest.*—When the patient leaves the operating table rest is to be the first consideration—rest for the body, rest for the mind; the latter can only be attained simultaneously with the first. The woman should be placed upon her back, and kept in that position for the first few days or until her bowels have been moved. If a drainage-tube, especially a glass one, has been employed, she must remain in this position until it is removed. While upon her back the knees may be drawn up or the legs extended, as is most comfortable for her. She will frequently desire a change of their position, which should always be made by the nurse. While the knees are drawn up they are to be supported by a pillow inserted under them, so as to remove the strain incident upon the muscular effort necessary to keep them in position if left to themselves. It is never to be forgotten that when a patient lies for a considerable length of time in any one position every crease or wrinkle in the bed-linen becomes a source of annoyance, if not of great discomfort. The woman is intensely uncomfortable, and is suffering considerably from pain at the best: every possible added source of discom-

fort must be removed. She is sure to suffer a great deal of pain and distress as the result of her operation, and if kept on her back she naturally attributes all the trouble to the position, when in reality it is not so. It should be one of the chief objects of the nurse from the first to keep both the bed-gown and the sheets under the patient's back perfectly smooth. A woman will beg hard to be allowed to turn, if only for a moment, when, if her clothing and the bed-sheets are smoothed out and her pillows shaken up, she will be rendered fairly comfortable, and will remain so for a considerable length of time. This absolute rest upon the back is desirable for a number of reasons: If she is allowed a little liberty, she will toss and turn about, hoping to find relief first in one position, then in another, only to fail; but in the meanwhile a ligature which has been loosely placed or which encircles an especially large pedicle is unable to withstand the tension it is placed under, and bleeding begins—possibly only slight in amount, but it may be sufficient to kill. When a drainage-tube is used, if made of glass, it is very likely to become broken, and if of any other material, displaced. The stomach, which is already irritable, becomes worse, and the vomiting is not so quickly controlled. Every movement causes the patient pain, and if the edges of the abdominal wound are not closely coapted, they are apt to become displaced, as are also the dressings. The pulse is always more steady with the patient in the dorsal position.

*Vomiting.*—Rest must not only be obtained for the body but also for the stomach. The anesthetic has rendered that organ so irritable that the slightest disturbance causes it to reject anything it may contain. The retching and vomiting following abdominal section are exaggerated over and above that from simple anesthesia. The symptom is to be treated by rest, pure and simple. Under any circumstances the organ will remain irritable until the effect of the anesthetic has worn away, and drugs will not improve its condition materially: it will be extremely fortunate if they do not render it worse. The treatment of the vomiting consists in allowing the stomach to remain quiet. This is best accomplished by withholding drugs, stimulants, food, or water. Absolutely nothing should be allowed to pass the patient's lips until the vomiting has ceased, which will generally be within from twelve to twenty hours. Should it be necessary to administer nourishment during this time, rectal enemata may be used; however, the patient

usually does very well without either nourishment or stimulants for several days.

*Drink.*—It is well to withhold fluids until the vomiting has entirely ceased, and then to administer them only in small quantities. They should be begun by allowing a small spoonful of hydrant- or soda-water every fifteen minutes, testing the ability of the stomach to retain and absorb it, and gradually increasing the quantity until within twelve hours the patient is taking an ounce each hour. The mouth may be moistened and cleansed during the interval of vomiting immediately succeeding the operation, by the aid of a wet cloth on the finger of the nurse. Should the thirst become intolerable during this period, it may be relieved by administering an enema of two or three ounces of hot water at intervals of four hours. The habit of giving ice by the mouth is bad and should be avoided. The cold water accumulates in the already over-irritated stomach, which is in no condition to absorb, until finally it is rejected, in the meanwhile having rendered the patient more uncomfortable. The intense thirst created by the withholding of drink is a great desideratum, as the blood-vessels, being unable to satisfy their demand for fluids from the stomach, draw upon the serum and blood which have accumulated in the pelvis. An amount of septic matter of which the peritoneum might readily dispose may cause a septic peritonitis and death if it can find so favorable a medium in which to develop as is afforded by this accumulated bloody serum.

*Food.*—For the same reason that it is unwise to give drink it is best to withhold food. The stomach will not retain it until it has recovered from the irritation of the ether: even should food be retained, it will accumulate and remain unabsorbed, the added irritation of its presence causing an excessive pouring-out of gastric juice and considerable discomfort to the patient. In addition, purgatives will not act so readily when administered together with food, and it is desirable to have the bowels move as soon after an operation as possible. If food lay on the stomach for any length of time, decomposition sets in and flatulence is induced. Food may safely be withheld for forty-eight hours excepting in unusual cases, when, if it be required, it may be given in the form of enemata; stimulants may be administered in the same manner when indicated. When the stomach has shown itself thoroughly tolerant to drink, it is then time to begin to offer the patient fluid nourishment.

Buttermilk is most acceptable to the majority of women. It should be given in small quantities often repeated, half an ounce every hour or two, testing the capability of the stomach to retain and digest it. It is not wise to attempt too much in the way of feeding until the purgatives have gotten well under way. Milk, unless predigested, is not a good food for this class of patients; it almost invariably causes the formation of flatus. Beef-tea or beef-extracts may be alternated with the buttermilk. Soups or broths of any kind may be substituted as the patient tires of one or the other. In fact, any article of soft diet which is suitable for the sick-room may be of service, the greater the variety the better. As soon as the bowels have been opened, usually in about forty-eight hours, the patient's appetite begins to assert itself, and where before she took what was offered her under protest, she will now begin to enjoy what she is given. It is at this time perfectly safe to consult her appetite; anything that she fancies may be given her. As a matter of fact, for the first four days after the operation she will want little but soft or semi-soft food, but if after the bowels are opened she wishes solid food, it can do no harm to allow her to have it. She has been starved for three or four days; now feed her generously. There are exceptions to this, but they will be noted in their proper places.

*Purgatives.*—It is imperative to obtain a movement of the bowels at as early a date after operation as possible. The condition of the bowels and pulse is the surest indication of the progress of the patient. If at the end of forty-eight or sixty hours a good and satisfactory movement of the bowels has been obtained, and the pulse be below 100 beats to the minute, the patient is convalescent. If, on the other hand, the bowels remain unmoved in spite of all efforts to open them, tympany begins to appear, and the pulse slowly rises to the neighborhood of 120 beats to the minute or higher, it is a serious matter for the patient. The one hope under these circumstances is to get the intestinal canal open, and it is at times astounding to note the great change for the better which takes place when this has been satisfactorily accomplished. The distress incident to the distension will have disappeared, the vomiting will have ceased, the pulse will have dropped to the neighborhood of normal, the anxious expression of the face will have cleared away, and the patient will look and express herself as feeling very much better in all respects. The alteration is that of complete change from an

appearance and condition of extreme distress and suffering to one of absolute contentment and comfort. Twenty-four hours after the operation, or as soon as the vomiting has ceased, calomel in half-grain doses, to be repeated each hour, should be given until ten or twelve doses have been taken: this should be followed by a Seidlitz powder or a tablespoonful of Rochelle or Epsom salts, dissolved in a small quantity of water, every two hours until the desired effect is accomplished. As soon as the bowels begin to rumble, flatus is passed, or the saline is rejected a large enema of hot soapsuds, a quart or more, containing a tablespoonful of turpentine, should be given: the enema may be repeated at intervals of three or four hours if necessary. Calomel will be retained upon the stomach when everything else is rejected, but there must be a limit to the administration of this drug, else the patient will become salivated. A stomach which is ejecting everything will at times become settled when the calomel is begun. If the magnesia salts are not retained, some other form of drug will have to be used, such as compound licorice powder, or, in desperate cases, even croton oil. When the bowels have not responded to treatment by the end of the third day after operation and the pulse has gradually risen to 130 beats or more, it is the exceptional case which recovers: such patients are generally dead by the end of the fourth day. Efforts to obtain the desired result should not cease until the case is clearly hopeless. If the bowels do respond, even apparently desperate cases at times rally quickly, and are convalescent in a few hours. The depletion of the blood-vessels incident to the purgation is another factor in causing the absorption of the bloody serum in the peritoneal cavity, and for this reason, if for no other, it is desirable to secure a number of watery stools. Subsequently a daily movement should be secured.

Should any of the intestines become injured during the course of the operation and there is danger of fecal extravasation, absolute rest must be obtained for the bowels until such time as Nature may protect the dangerous point with peritoneal lymph and adhesions. Under these circumstances morphia may be administered hypodermatically in quarter-grain doses repeated sufficiently often to keep the intestines quiet. Three or four doses in the twenty-four hours will answer the purpose: opium suppositories of one grain each, repeated at intervals of six or eight hours, would answer just as well. The opiate, in addition to helping to inhibit the peristaltic action of the intestines and tending to prevent the natural secretions in the



gut, allays the irritability of the stomach and prevents retching or vomiting until such time as the adhesions and lymph have become strong enough to offer the necessary resistance. Should vomiting occur during the first few days, almost certainly the intestinal contents will be forced through the light barrier formed by the lymph and into the pelvic and abdominal cavity. No effort should be made to move the bowels for at least four days after operation, when small doses of magnesium sulphate or castor oil may be administered, followed by an enema of soap and hot water as soon as the patient feels a tendency for the bowels to move. Great care should always be observed in such cases in giving the enema that the bowels be not over-distended, else irreparable damage may result. If the injury has been to the small intestine, it will have been repaired with stitches at the time of the operation, and little difference need be observed in the after-treatment except that purgatives should not be begun until the end of the second or third day. Not much harm can occur from an injury so high up if properly repaired. Where the damage is to the sigmoid flexure of the colon or to the rectum, as is most generally the case, it is so low down in the pelvis that the sutures cannot be placed satisfactorily or safely, and unless great care is observed, irretrievable damage may be done when the bowels are allowed to open. It is not a good plan to allow the intestine to remain quiescent for too long a time, else the colon and rectum will become filled with scybalous masses which may prevent closure of a laceration or may tear it open after it is partially healed. When the bowels have once moved they should be opened daily, if not acting naturally, by a laxative or an enema.

*Bladder.*—Should it become necessary, the urine may be withdrawn with the aid of a catheter. It is only, however, when absolutely necessary that the catheter should be used. If a proper length of time is allowed to lapse after the operation, most patients will void their own urine, and, having once done so, there will be no further necessity for the use of the instrument. If the bladder is once relieved artificially, it is most likely that it will be again demanded by the patient, and if the temptation be yielded to a few times, it will be difficult to break the habit. It is best, if possible, to force the patient to pass her own urine from the start, and if she is watched carefully for any untoward symptoms, the urine may be allowed to accumulate for from fifteen to twenty hours if necessary, the patient being offered the bed-pan occasionally



during this interval, and every effort being made to aid her in her endeavors to accomplish the act of urination. A small stream of warm water squeezed from a sponge, if allowed to run down over the meatus at times, accomplishes the result. When the catheter is used, the greatest care should be taken that the bladder be not infected. The instrument should be preferably a soft-rubber one, and should be antiseptically clean. It should have been prepared by being immersed in boiling water, washed in a bichloride-of-mercury or carbolic-acid solution, and kept in alcohol until needed. It should never be used without fully exposing the parts. The patient's knees being well drawn up and separated, the labia are drawn apart with the finger of one hand and the meatus exposed to view. The parts are thoroughly cleansed with a piece of cotton wet with a carbolic-acid or bichloride-of-mercury solution, and the point of the catheter introduced directly into the meatus without being allowed to come in contact with any of the contiguous parts. Thus, and only thus, can the patient's bladder be ensured against infection. A cystitis at this stage of the convalescence will often give rise to serious symptoms and an immense deal of discomfort, to say nothing of danger to the patient.

If during the operation the bladder has been injured or torn open, whether it has been sutured or not, the after-management of the urine must differ somewhat from that which is usual. If under these circumstances the organ is allowed to become distended, there is apt to be leakage at the point of injury between the sutures, or if only the outer coats of its walls have been torn away in separating adhesions, a rupture might readily occur at this point were the urine not removed for fifteen or twenty hours. It should always be arranged in case of such injuries that there be no accumulation allowed. A soft-rubber catheter may be left in the bladder permanently, by means of which the contents can be conveyed into a vessel over the side of the bed, through a long piece of drainage tubing attached to the end of the catheter; or, better still, a self-retaining female catheter may be utilized for this purpose. Three or four days will be sufficient for its use, after which the patient may be catheterized five or six times in the twenty-four hours, the use of the instrument becoming gradually less frequent, until in a week or ten days it may be omitted altogether. If during the convalescence cystitis should develop, it becomes necessary to treat it promptly. A careful inspection of the methods of cathe-

terization should be made, and rectified if found faulty. The vast majority of cases of cystitis arise from this source. Diuretics should be administered freely, provided the stomach has reached the state when it can bear them.

If the cystitis develops within the first day or two, before the bowels are thoroughly opened, internal medication is better withheld for the time and local treatment depended upon. In any event, most reliance must be placed upon the local management, irrigating the bladder twice daily with a mild antiseptic solution and seeing to it that no residual urine remains to undergo decomposition. A warm solution of permanganate of potash, not sufficiently strong to cause burning, may be passed into the bladder until the patient complains of the distress. This is accomplished by the aid of a soft-rubber catheter with a piece of long rubber tubing attached, terminating at the opposite end in a small funnel. The funnel is elevated, and the fluid allowed to enter the bladder through the introduced catheter, by the force of gravity. As soon as the woman complains of much pain, the funnel may be depressed into a vessel resting on the floor, and the solution allowed to siphon away. The action of the residual urine will have decomposed the permanganate of potash in the solution, and it will return almost the color of ordinary water. It is then necessary to refill the bladder without withdrawing the catheter, with a fresh solution, in order that the unaltered drug may come in contact with the inflamed and suppurating walls. After a few washings the patient will become more comfortable and the cure will be accomplished quickly. The urine in the mean while must be rendered as nearly neutral as possible.

If there is preëxisting kidney disease, symptoms of uremia may develop after the operation. The quantity of urine voided should be carefully noted and this symptom anticipated: following the operation, the quantity of urine secreted during the first few days is always small, often not more than eight or ten ounces during the first twenty-four hours, but increasing rapidly in amount with each succeeding day: due allowance must be made for this. The treatment of this complication will be similar to that of uremia under any other circumstances. If it once develops, the patient is usually lost, although an occasional case is saved by prompt action. Purgation, diuretics, diaphoretics, heat, and local bleeding are all indicated, and must be applied promptly if any good is to be derived from them.

Croton oil for purgation, cocaine and digitalis for diuresis, leeches and cupping over the kidneys for bleeding, and dry heat applied about the parts, are the chief remedies to meet the indications.

*Bathing.*—Bathing is an important element in the comfort of an operative case, and should be begun as soon after operation as possible. The bowels will, in a normal case, be opened by the end of forty-eight or sixty hours. As soon after this as the patient has had time to rest a while and regain a slight amount of strength, there being always a period of a few hours of weakness after the purgation, a warm sponge-bath may safely be given. The end of the third twenty-four hours is about the usual time for this first general bath: from the very first the hands, arms, neck, face, and legs should have been frequently bathed. From this time a daily sponge-bath of warm water, followed by alcohol, is to be given. The amount of comfort derived from this procedure is indescribable, and, if due care be taken not to chill the patient, not the slightest harm can come of it. The hair and teeth should receive attention from the very first.

*Flatulence.*—This symptom is the most distressing one met with in the after-treatment of abdominal surgery. It accompanies, more or less, all cases, although in a very great many the amount is so slight that it is hardly noticed and requires no special attention. Where the woman's life is seriously threatened and she is eventually going to die, it is usually at its worst, and practically nothing can be done for its relief.

Flatulence itself is capable of killing, and almost to the last it is impossible to say whether or not there is a chance of saving the patient: for this reason there should be no cessation in the efforts for its dissipation. Usually it does not appear for from twelve to twenty-four hours, and in the majority of cases, where the bowels are opened at the end of forty-eight hours, it is permanently relieved. This being true, the great effort for its relief should be in the direction of securing a movement of the bowels. That form of flatulence which appears within twelve hours after the operation is usually easily dealt with, and in itself has no great significance and need give no particular alarm. It is the variety which begins to show itself toward the end of the second twenty-four hours, which is accompanied with a refusal of the bowels to move, together with a quickening and weak pulse, which is to be dreaded: it most frequently means septic peritonitis and death. Little in the way of drugs, excepting purgatives, is

worth administering. Large rectal enemata of water and turpentine, and the rectal tube introduced and at times allowed to remain *in situ*, will in some cases give relief. This is not very great, however, and the practice has more theoretical than practical value. Puncturing the intestines through the abdominal wall is never justifiable: if it is thought desirable to attempt to relieve the distension by this source, a small incision should be made in the abdominal wall, a knuckle of gut caught up, opened, and either stitched to the abdominal wall or else closed by a few sutures when the opening has accomplished its object. The same thing might readily be done through the original incision by removing a stitch or two and separating the edges of the wound quickly with a finger. The whole procedure can be carried out with the patient lying in bed and without an anesthetic. It is rare that anything can be hoped for from this direction, however, and it is seldom worth considering. Usually the result would be that only a single coil of intestine would be emptied, and nothing particular would be accomplished. The stomach-pump is a valuable aid in some of these cases, especially where the distension appears quite prominent in the epigastric region. Large quantities of fluids and air may be occasionally removed by its aid, and the distressed expression on a patient's face will clear up almost instantly after its successful use. Where it succeeds at all, after the first application the patient will in a few hours beg for a repetition, so great has been the relief obtained.

As a matter of fact, unless the bowels can be gotten to move we can do little to permanently relieve this symptom, and even in those cases of sepsis in which the bowels have responded to the purgatives and enemata in a more or less satisfactory manner, the relief from the flatulence is not great, nor is it permanent, returning in a few hours with the bowels obstinately constipated. At times, when nothing else will answer the purpose, turning the patient on the side will bring about the desired result.

The causes of flatulence are varied. Too early administration of food where the stomach is so irritable that it does not perform its function of digestion and absorption, is a common cause. Milk, especially, of all foods is most likely to favor its formation.

It invariably accompanies sepsis, in which case it is most stubborn. Handling the intestines during the operation is supposed to be a common cause, but at times it follows, in cases where the

intestines have not been seen or have been handled a minimum amount: at other times when there has been partial evisceration and severe handling, even to the placing of stitches in the intestinal walls, there is no flatulence following the procedure. The real cause of flatulence is unknown, and its treatment is most unsatisfactory, except where the bowels can be gotten to move, when, as a rule, it disappears. Occasionally, however, where daily free evacuations of the bowels are taking place, a distressing amount of flatus may remain for days.

*Drainage-tube.*—The care of the drainage-tube is one of the most important parts of the after-treatment. Should the tube be made of glass, each time it is cleaned the nurse or physician is practically dealing with an open wound, and just as great care should be manifested in its cleansing as is done at the operation itself: for the first few days the danger of infection is just as great. Should the tube-track become infected at this time, the chances are largely in favor of a septic peritonitis and death; if the infection takes place later, when Nature has thrown out enough lymph to protect the peritoneal cavity, a suppurating pelvis with, possibly, a more or less permanent fistula, may be the first result. Under any circumstances infection is dangerous: if it does not end in death, it generally terminates in a fistula, which is more or less stubborn in healing. In cleaning a glass drainage-tube it is necessary to pass a long-nozzled syringe to the bottom of the tube in order to suck up the serum and blood which have accumulated in the pelvis. The syringe itself may be infected and carry the poison into the pelvis, or it may become infected as it passes the mouth of the tube. At each tube-cleaning the hands should be well washed with soap and water and disinfected with a bichloride-of-mercury solution. Clean towels should be placed about the tube, and the dressings over its mouth removed, so as to expose the opening. The syringe should be immersed in boiling water and the barrel filled and refilled several times; it is then to be filled and refilled several times with a bichloride-of-mercury solution (1:1000); from this solution it is to be passed again into hot water and the mercurial washed away, when it is ready for use. The point of the syringe is passed to the bottom of the tube, and then withdrawn about a quarter or half an inch, so that when the piston is drawn the fluids in the pelvis will be sucked up, but not the tissue of the pelvis. If any clots or shreds of tissue remain in the pel-



vis, the suction will draw them to the mouth of the nozzle, when by keeping up the suction they may be readily withdrawn. The syringe is to be used until the tube is perfectly dry. After using the syringe, it is to be first washed out thoroughly with hot water until the flow comes away perfectly clear and unstained, then the bichloride-of-mercury solution is to be repeatedly drawn into it, and the syringe put away wet with the solution. It is to be placed immediately upon a clean towel kept for that purpose, and folded up so as to remain unexposed until again required. Each time the tube is cleaned its mouth is to be well washed with a piece of cotton wet with a bichloride-of-mercury solution, and the wet cotton is to be passed down the tube as far as possible (an inch), so as to render its caliber thoroughly clean. The rubber-dam about the tube should be carefully cleansed of any drops of blood or serum which may have soiled it, and clean cotton is placed over the mouth of the tube. All this trouble may seem unnecessary, but any one familiar with the dangers of sepsis will appreciate its importance. A drop of blood or serum left about the mouth of the tube or in the syringe will quickly undergo decomposition. It is much easier to prevent sepsis than to cure it.

Each time the tube is cleansed it should be twisted back and forth several times. The lymph which is thrown about the tube, penetrates the small perforations at its bottom, and if not broken up, and kept so by frequent rotation, becomes firm enough to cause considerable difficulty in the subsequent removal. This difficulty has been such a common one that several instruments have been devised for the express purpose of cutting the tube loose. If the simple precaution be observed of twisting the tube back and forth at each dressing, no such difficulty will ever arise.

The drainage-tube should be allowed to remain *in situ* until such time as it is no longer needed for drainage. This time varies in different cases, and no hard-and-fast rule can be laid down for all. A few drachms of clear serum may always be found in the peritoneal cavity, and when the amount which can be drawn from the tube reaches two or three drachms at five or six hours' interval, and this fluid is clear or nearly approaches straw color, the time for the withdrawal of the tube has come. A drainage-tube should be cleansed as often as it becomes necessary, no attention being paid to the shortness or length of time. Immediately following the operation it should be emptied every fifteen minutes



or half hour. It should never be allowed to go sufficiently long to overflow and soil the dressings. As the quantity of fluid decreases, the interval of cleansing is lengthened, until by the end of twenty-four hours it is generally not necessary to clean it oftener than once in three hours.

Sometimes in twenty-four hours the tube may be withdrawn, or it may be necessary to allow it to remain for a week: about three days is the average length of time. In withdrawing the tube it is only necessary, after removing all the dressings, to make traction upon it, meanwhile rotating it as it is drawn out. The same careful antisepsis is to be observed in removing as in cleansing it. A small piece of antiseptic gauze is placed over the opening left by the withdrawal of the tube, and the wound edges are drawn together with a strip of adhesive plaster. The dressings are replaced, and not disturbed again until the stitches are removed.

In some cases the surgeon fears that the pelvis or certain parts of it may suppurate or that a fecal fistula may form, and yet the drainage-tube is ready, from all appearances, to be withdrawn a day after the operation. Under these circumstances it is best to allow it to remain for three or four days, cleansing it only often enough to have an idea of what is going on at its lower extremity—possibly twice in the twenty-four hours unless the symptoms indicate otherwise.

Should suppuration occur, the tube is to be kept in place until the amount of pus discharged begins to diminish, when it may be withdrawn and the opening gradually allowed to contract. During the acute stage of suppuration the tube should be cleansed every few hours and washed out with boracic-acid solution: later, after it has been dispensed with, peroxide of hydrogen is the most efficient wash for cleansing and disinfecting the tube-track. The opening generally closes in a week or two, or if not, the condition becomes chronic and possibly a permanent fistula may result. As a rule, these fistulous tracts close in time, even after existing for several years.

Should the drain be of gauze instead of glass, the care of it will be somewhat different. The gauze drains by capillary action, and keeps the dressings continually wet, so that it is necessary to change them frequently. The whole arrangement of the abdominal dressing is such that the parts about the drain may be changed without removing all. The one commonly used is that known as the Mikulicz drain. It consists of a gauze bag containing a number

of pieces of gauze, the end of each piece protruding from its mouth. In withdrawing the drain the pieces are picked up with a pair of dressing forceps and withdrawn separately; as they are removed the bag collapses, and is easier withdrawn than if the whole drain was removed together. In drawing out the bag care should be taken that no pieces of intestine or omentum follow, as at times is apt to be the case: should this occur the viscus is to be replaced at once with the forceps and the edge of the wound drawn together with the ligature which was placed for that purpose at the time of operation, or by a strip of adhesive plaster, care being taken that intestine or omentum be not included between the lips of the wound. Any kind of drainage is an indication of incompleting surgery, possibly unavoidably so, but nevertheless incomplete, and is to be avoided whenever and wherever possible. Drainage should only be tolerated with the distinct understanding that it is a necessary evil, but only necessary occasionally. Abdominal surgery should be and is possible with not more than a maximum of 5 or 10 per cent. of drainage cases—probably less.

*Dressings.*—An ordinary case of abdominal section need not have the original dressing removed until the time has arrived to take out the stitches. Should a drainage-tube be in use, the dressing may become soiled, when it will be necessary to change it, or if the incision or the stitch-tracks suppurate, it will be advisable to remove the dressing, not only to replace it by a clean one, but in order to apply remedies to the suppurating parts. A full week should elapse before disturbing the stitches. Stitch-hole abscesses may arise before the stitches are removed or afterward. The stitches should be taken out on the eighth day unless suppuration has previously occurred, when it may become necessary to remove them immediately. This procedure is accomplished by picking up one of the strands of the stitch by the aid of a pair of hemostatic forceps, lifting the knot out of its bed, and exposing both strands of the stitch below the knot. The blades of a pair of scissors are opened, and made to include one of the strands as it dips down into the tissue; the scissors are pressed down into the skin at the same time that the knot is elevated by the forceps. This procedure exposes a portion of the ligature, which has been buried in the tissue, and which is white and clean and has not been infected. The ligature is cut in this uninfected area. As the cut end is drawn through the tissues in its removal,

there is no danger of dragging infection with it, when if the stitch had been cut above the skin-surface a portion of contaminated suture would infect, in many cases, the suture-track. In this manner are caused stitch-hole abscesses which form after the stitches have been removed. After the one strand of the stitch is cut, the knot is to be drawn in the direction *across* the incision, not away from it. Should it be drawn away from the incision, there is an excellent chance that the skin-union will be separated at points, and possibly throughout its whole extent.

After the stitches have been removed the parts about the incision should be cleansed with a piece of cotton dipped in a solution of bichloride of mercury, care being taken not to disturb the line of union. The dried clots may be left alone, else in their removal some raw surface may be exposed. A small piece of antiseptic gauze is to be placed over the incision, and the parts held together by several strips of adhesive plaster, a binder being placed over the whole. Usually no more attention need be paid to the wound.

If the incision suppurates, it is best to remove the stitches at once, allow the superficial parts of the wound to separate, and treat the incision as an open wound by disinfecting and packing. The cicatricial tissue resulting from this method of healing will be the surer barrier to a future hernia. If stitch-hole abscesses exist, it is only necessary to provide for their drainage. Usually as the stitch is withdrawn the pus will flow from the opening left by its removal, and it may be necessary to empty the abscess once or twice a day by gently squeezing it, care being taken not to exert too much pressure: the abscess will, as a rule, heal within from two days to a week. A considerable rise of temperature and pulse may accompany these abscesses, but the symptoms disappear almost at once after drainage has been provided. While suppuration goes on the dressing should be changed twice daily and the parts thoroughly cleansed. It should be treated, in fact, like any suppurating wound. If any of the cavities are very large, it may be well to inject them with peroxide of hydrogen or bichloride-of-mercury or other antiseptic solution.

*Hemorrhage.*—For hemorrhage following an abdominal section there is but one treatment. As soon as the surgeon is reasonably certain that serious bleeding is going on, the wound must be opened and the bleeding vessel ligated. Attempts to apply any other treat-

ment are useless, and the less time lost the more chance there will be of saving the patient. Care should be taken in re-opening the wound that everything is just as aseptic as at the original operation.

If a drainage-tube has been used, it will usually indicate that bleeding is taking place, but this is not to be depended upon for an indication as to how much blood is being lost. The abdomen has been opened and found filled with clots when the tube projecting into its cavity had been cleaned every ten or fifteen minutes, and it was supposed that all the blood had been withdrawn. Even if the tube does not indicate that a dangerous amount of blood is being lost, if the constitutional symptoms look strongly suspicious, the abdomen had better be re-opened and the bleeding vessel tied. The constitutional symptoms will be the same as those of concealed hemorrhage from any other cause. If the bleeding comes from torn adhesions, and is simply a free ooze, no alarm need be felt concerning it. It matters not how free it may be at first, it will last but a short while. The indications are to keep the drainage-tube perfectly dry, so as to favor coagulation of the blood and consequent cessation of the bleeding. The oftener the tube is cleansed and the drier the pelvis is kept, the sooner will the hemorrhage cease.

If the patient, having rallied from her ether, with a good pulse and practically normal temperature, be found in the course of the next twenty-four hours to be showing indications of collapse, together with a rising pulse and a falling temperature, hemorrhage will almost always be found to be at the bottom of the trouble. The pulse under these circumstances becomes feeble, and is rapid and running in character. The temperature and pulse, together with the general condition of lassitude and growing indifference, are almost pathognomonic of the condition. If the bleeding be allowed to continue, these symptoms gradually deepen, and the more advanced indications of collapse, such as great pallor, sighing, and cold surface, supervene. Intravenous infusion or infusion into the loose subcutaneous connective tissues of a sterilized (when possible) salt solution is often urgently demanded.

*Shock.*—The symptoms of shock may readily be mistaken for hemorrhage, the difference being that in hemorrhage the indications do not begin for some hours after operation, while in shock they are present from the first. Otherwise, the two present so many points of likeness that it is at times difficult to say which is present. The

indications for treatment in shock following abdominal section are exactly the same as for that condition from any other cause—dry heat applied to the whole surface of the body, care being taken not to burn the skin with the hot cans or bottles; whiskey, ammonia, nitro-glycerin, and digitalis may be used as necessary adjuncts in the treatment. Strychnia is, according to some physicians, the most valuable of all drugs for this condition, and may be given freely without fear. It should be given hypodermically in doses of one-twentieth of a grain repeated every half hour for two or three hours, and then each hour until the patient is decidedly better or shows signs of muscular twitching. It is far better to take the chances of producing strychnia-poisoning than to give two small a quantity. If the patient can be carried over the shock, it will be time enough afterward to attend to the poisonous symptoms.

*Sepsis.*—The management of this complication will depend much upon the character and extent of the infection. A general pelvic and abdominal septic peritonitis following abdominal section is never cured: the patient invariably dies. For more than two days it is doubtful just what is the trouble with the patient; in fact, one cannot be certain that there is anything seriously wrong. By the time it is reasonably certain that there is septicemia to deal with, the patient is beyond relief, and is dead before the end of the fourth twenty-four hours after the operation. Usually the condition of the patient immediately following the operation is fairly good, but within the first twenty-four hours the pulse gradually and almost imperceptibly creeps up until it reaches 110 to 120 beats to the minute. It is weak and inclined to be running. The temperature simultaneously ranges in the neighborhood of 100 or more degrees. The ether-vomiting is prolonged beyond the usual limit of twenty-four hours, when most probably the stomach will have an interval of rest for six or eight hours before the secondary vomiting due to the septicemia sets in.

During this interval of rest from vomiting the pulse gradually but steadily creeps higher and higher, becomes more rapid and weak, and finally thready. The temperature at the same time becomes more and more elevated. The abdomen becomes distended, due partly to flatulence and partly to the retention of the purgatives and nourishment. In spite of all efforts to move the bowels, no indication of horborygmus or of passage of flatus can be obtained. The stomach finally begins to expel every-



thing placed in it. The rectal enemas are promptly rejected. Profuse sweating and cold creeps set in. The dull, heavy muscular pains of septic poisoning supervene. The patient becomes restless, tossing from one side of the bed to the other. The facial expression, which has been gradually becoming more and more anxious, deepens, and the patient assumes an altogether hopeless appearance. Prior to death the pulse becomes so rapid and weak as to be imperceptible: the temperature may rise even to  $106^{\circ}$  or  $107^{\circ}$ , and the body is bathed in a cold, clammy perspiration. The vomited matter is dark brown.

No effort should be spared to secure a passage of the bowels until the trouble has plainly manifested itself.

Whiskey and strychnia should be given to the point of tolerance, many of these patients taking from a pint to a quart of whiskey in the twenty-four hours without showing signs of its constitutional effect. Quinine in large doses is a valuable adjunct to the management. The hypodermic needle and rectal enemas must for the most part be depended upon for the administration.

If at the end of sixty hours there is no longer doubt as to the complication, it is useless to make further effort, other than to render the patient's death as easy as possible. Under these circumstances opium is the one drug to depend upon. It will relieve the pain and suffering, and that is all it is in the power of the physician to do for his patient. Theoretically, the proper treatment would be to open the abdomen, irrigate it thoroughly and introduce a drainage-tube. It would probably be best to do this as early as twenty-four or thirty-six hours after operation should by any chance the diagnosis be made, but even at this early period it is more than doubtful whether any good would be accomplished. When the abdomen is opened the condition found will be that of a general matting together of the pelvic organs and those loops of intestines and omentum hanging into the pelvis. An ounce or two of dark fluid will be observed on breaking up the adhesions. The only effect obtained will be to expose more surface to absorption by separation of the adhesions. If any good can be accomplished in this direction, it will be by providing free and continuous irrigation of the whole pelvic cavity for several days or until such time as the patient is convalescent. If the infection be introduced at the time of the operation, and be given twenty-four or thirty-six hours in which to develop, the case is practically hopeless. The diagnosis



cannot possibly be arrived at earlier than at the end of forty-eight hours with any degree of certainty.

Should a local suppuration occur about the pedicle or elsewhere in the pelvis and an abscess result, the condition is amenable to treatment and the patient will easily recover. The symptoms induced by the abscess will be the ordinary ones of septic infection, which, taken in conjunction with the knowledge obtained from the operation, will readily indicate their true cause. For the first few days the patient progresses favorably. Movements of the bowels are obtained in response to the purgatives and enemas, but not of a satisfactory character. The pulse remains high, from 100 to 120 beats to the minute, but fairly good in character. The temperature ranges from 100° to 102°, or higher, with a daily evening elevation. The patient may at times reject her food, having little or no appetite. Her mental condition is clouded, and she complains of dull pains and cold creeps. Her general condition is heavy and lethargic. Night-sweats are present. The abdomen is more or less distended, and colicky pains are apt to disturb her in consequence. These symptoms are of more gradual development than those of general septic infection of the pelvic cavity. At no time do they become so intense, and seldom threaten speedy death.

The only proper treatment is to empty the abscess and drain the cavity after having washed it out. It may be necessary to reopen the abdomen to accomplish this, or the posterior vaginal cul-de-sac may be opened, a finger passed into the pelvic cavity, and adhesions penetrated until the purulent matter be found. The parts are then gently irrigated and loosely packed. Frequently in these cases a drainage-tube has been used in the pelvis, and it is then most probably near the seat of the abscess. Under these circumstances, if the symptoms will allow of delay, it is best to wait for a few days, or even a week if necessary, in hopes that the abscess will rupture into the drainage-tube, which it generally will do. Should the temperature, pulse, and other symptoms become alarming at any time, the lower end of the incision had best be opened, and the abscess sought in the pelvis amid the adherent intestines and opened with the finger, care being taken not to invade, if possible, the general peritoneal cavity. If the pus be thoroughly washed away, the temperature and pulse will fall almost immediately to normal, and the other symptoms will disappear coincidently. Stimulation by whiskey, strychnia, and quinine is to be begun early and car-

ried out freely, only stopping short of the physiological action of the drugs. Septic symptoms due to stitch-hole abscesses are to be treated as already described under the head of Dressings.

**FISTULÆ.**—These are either simple suppurating, fecal, or urinary. The simple suppurating fistula is the most common. It is generally due to an infected tube-track or to septic ligatures. The majority of fistulæ close eventually without special treatment for which reason they should be treated expectantly rather than by a secondary operation. If they are caused by an infected ligature, they will not heal until the ligature has come away, when they usually close very promptly. Various methods have been proposed for removing the ligature through the fistulous track without re-opening the abdomen. A pair of small-bladed forceps may be passed into the opening and an attempt made to catch the offending body: the introduction of pieces of twisted wire and various other devices have been adopted, with success in exceptional cases. The silk will eventually work itself free and appear at the mouth of the fistula. Few fistulæ remain open unless there is a foreign body present as the cause: the exception occurs in women who are probably suffering from tubercular or other general conditions.

Under any circumstances the sinus should be kept clean and free from the discharges; at the same time the general health should be looked after, and if there is any condition such as tuberculosis present, it should be treated accordingly. Peroxide of hydrogen diluted with water—half and half—or in its pure state is probably the best wash which can be used. It is to be passed, by the aid of a syringe, to the bottom of the fistula and allowed to regurgitate, the injection being kept up until it comes away clear and clean without any appearance of froth: it would be well to wash the sinus out several times daily, the dressings being changed frequently enough to keep the parts clean.

It is proper to wait from three to six months, or even longer, before attempting any radical procedure. The operation necessitates opening the abdominal cavity, with all the chances of infecting the peritoneum with the discharges of the sinus. Should the operation be undertaken, the parts must first be thoroughly disinfected, and the sinus washed out with peroxide of hydrogen and a solution of bichloride of mercury. The abdomen is opened, the adhesions broken up to the bottom of the fistula, and the ligatures removed:

the walls of the fistula should be curetted away as far as possible. Should no ligature be found, the walls of the sinus must be thoroughly destroyed. In closing the abdomen a drainage-tube must be introduced for a few days in order to guard against possible supuration.

Nothing can be done for chronic fecal fistulæ short of an operation, except to keep the parts clean. It is not always advisable to attempt an operation in these cases, for the reason that the opening in the bowel is often so low down in the rectum that it is impossible to bring the parts within reach so that sutures can be properly placed: in addition, the tissues of the gut are often so badly disorganized that stitches will not hold, and a resection would be necessary, when from the low position of the opening this would be impossible. If the operation is undertaken, the parts must be thoroughly cleansed and disinfected; the bowels should be purged and the rectum washed out by an enema. After invading the abdominal cavity the adhesions between the coils of intestines are to be carefully separated down to the opening in the bowel.

Occasionally in old chronic cases the fistula can be dissected out as a complete tube down to the intestinal opening, in which case there would be a minimum danger of infecting the peritoneal cavity. Under any circumstances the edges of the fistula are to be freshened and turned into the gut, sutures being so placed as to retain the edges in apposition. If the opening is sufficiently high to allow of a resection of the bowel, this may become necessary, provided it cannot be closed. Should it not be possible to close the hole or to resect the gut, a drainage-tube must be so placed as to drain the immediate vicinity of the injured bowel, and the tube cleansed every fifteen minutes to allow of no spread of infection until sufficient lymph has been thrown about the seat of danger to protect the peritoneal cavity: in the mean time sufficient opium is given to keep the bowels quiet.

The operation for chronic fecal fistula is a tedious and dangerous one, and often results in failure or in disaster. It is the only hope of relief, however, and it is justifiable to take considerable risk with the hope of gaining a cure.

The primary treatment of fecal fistula is one of rest. Should the fistula occur three or four days after operation, enough lymph will have been thrown out to protect the general peritoneal cavity, and there will be little danger. Should it be discovered during the

first few hours, while cleaning the drainage-tube, the tube must be cleansed at intervals of not longer than fifteen minutes, and the bowels kept quiet by the use of opium for three or four days at least. When the bowels have once opened, they should not be allowed to again become constipated, but daily evacuation should be secured by the use of laxatives.

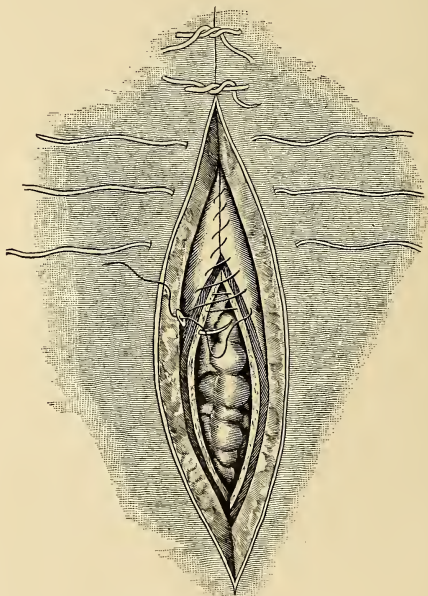
In the course of a week the tube may safely be withdrawn, and the fecal matter allowed to flow through the track formed by the lymph. As long as the tube is in place the opening will not close, but as soon as it is removed the parts begin to contract, and gradually the flow of fecal matter becomes less and less, until finally in a few weeks it has ceased altogether. Most fecal fistulæ will close spontaneously if treated properly from the first.

*Hernia.*—This is one of the common sequelæ of abdominal section, and is due to a failure of union between the cut edges of the muscles and fasciæ. The hernia usually does not appear for some weeks after the woman is out of bed, and then only as a small protrusion at one point, from which it gradually spreads, until, if neglected, it at last occupies the whole of the original incision. As a prophylactic measure against this accident the longer the patient is kept in bed after her operation the better: too early getting up puts a strain on the newly-united incision and predisposes to hernia. When the hernia has once appeared, but two courses are open—either to use support at the opening and if possible prevent it from becoming larger, or to perform a secondary operation for its cure. A properly-fitting truss will keep the intestines back and to a great extent render the woman comfortable, but there is no chance whatever of the opening ever closing if left to itself.

In making the incision, great care must be observed in opening the abdominal cavity at the seat of the hernia, for the reason that the intestines are very apt to be adherent to the sac. The anatomical relations are all destroyed, and there is no certain guide as to where the knife is about to enter the peritoneal cavity. After the abdominal cavity is opened the old incision should be split to the full extent of the hernia both above and below. The peritoneal and adventitious tissue covering the edges of the muscle and fascia completely around the opening must be trimmed away with the scissors and knife, and the redundant portions of the sac resected. The edges of the several tissues are brought into apposition and the wound closed in the usual way after an abdominal section.

Various methods of repairing hernias have from time to time been used with varying degrees of success, but all the indications are met by the above method, especially if an extra and separate row of sutures be placed in the muscles and fascia in order to secure and retain their coaptation. Either silk or silkworm-gut may be used for this purpose. Silkworm-gut is preferable as it gives a permanent support to the tissues, while silk is apt to become weak-

FIG. 341.



Sutures in place for the Repair of Ventral Hernia.

ened by absorption. Subsequently the patient should be kept upon her back for not less than four weeks, to allow of thorough healing. Should the buried sutures suppurate, it is due to faulty technique, and they must be removed before the resulting fistula will heal.

The usual length of time for a patient to remain in bed following an abdominal section is at least three weeks. During the early



part of the fourth week the patient may be allowed to sit up in bed, and by the end of the week she may begin to go about her usual duties. It is well, however, that she make a semi-invalid of herself for some weeks or more where this is possible, and secure the additional rest from work and worry. For six months or a year after the operation an abdominal binder should be worn, at the end of which time it may gradually be dispensed with. The neglect of these precautions often results in a very considerable amount of future discomfort to the patient.

Every woman who has had both uterine appendages removed suffers from symptoms of the menopause. Generally these are more stormy than those accompanying the natural menopause. Until this change is fully established the patient will not receive the full benefit of the operation. The condition requires treatment, and the indications are to be met as they arise in the way such symptoms are usually met in the natural menopause. The phenomena are essentially nervous, and the indications are for general tonics and nerve-sedatives.

As has been already noted, the infection which gives rise to the disease, requiring an abdominal section in pelvic inflammation, proceeds from the vagina or the uterus into the Fallopian tubes. The removal of the uterine appendages does not always cure the case, but is merely the necessary preliminary step. Some cases are completely cured by the changes which go on in the uterus incident to the menopause, but in others, in spite of this, the womb remains enlarged, heavy, and engorged, and the leucorrhœal discharges and hemorrhages remain just as profuse as before the operation. These cases require local treatment of the diseased uterus; otherwise a satisfactory result is not usually obtained except after a long interval. The womb should be thoroughly curetted, and the case treated as is proper in a case of endometritis and subinvolution. At times, however, the prolonged effect of the menopause is too much for even these cases, and they eventually, after several years, are relieved of their symptoms without any local treatment; other cases require that the womb be removed.

*Phlegmasia Alba Dolens.*—The attack begins, as a rule, about the end of the second or third week after operation, at a time when the patient is in apparent perfect health. Pain appears suddenly in the hip, followed by swelling of the part. The skin is hot to the touch and the temperature is elevated. The swelling and pain



spread rapidly downward, until within twenty-four hours the whole leg is involved. The tissues are hard to the touch, with no evidence of edema. In a few days the leg becomes less hard and the swelling and pain subside. At no time is there redness along the veins. The condition is accompanied by no septic symptoms. The complication may occur either upon the side upon which an ovary has been removed or upon the opposite side. One leg alone is affected, most generally the left. The condition remains for two or three weeks and even longer before the last trace has disappeared. We have known one case to last a year.

The leg is to be surrounded by soft pillows and an application of laudanum and lead-water made. This is to be kept up until the pain is relieved, after which the treatment consists principally of absolute rest in bed. A light diet and a withdrawal of stimulants are advisable. Friction is to be avoided. The etiology of the condition is not known.

#### PLASTIC OPERATIONS.

The after-treatment of plastic operations resolves itself into rest and cleanliness. The patient should be kept in bed two weeks, after which she may take another week in getting up and about. As in abdominal section, the longer she remains in bed the better for her, and where a patient can be made content, a month is not too long a time, especially for prolapse cases. If a gauze tampon has been introduced into the vagina, it should be removed within forty-eight hours, and need not be renewed. A warm vaginal douche of boracic acid should be administered daily, care being taken not to make any pressure on the points of suture. The douche should be used for the purpose of cleanliness, after which a single strip of gauze an inch or two in width may be passed if desired into the cul-de-sac with the aid of dressing forceps. This accomplishes the desired drainage with the minimum interference with the seat of operation. Especial care must be taken in this regard when cat-gut sutures have been introduced.

In cases of uterine curettement, if the cavity of the womb has been packed with gauze, the packing should be removed at the end of forty-eight hours and the vagina thoroughly cleansed by an antiseptic douche. Afterward an antiseptic vaginal douche should be administered daily. If instead of the gauze a drainage-tube has been introduced into the uterus at the time of ope-

ration, it should be removed daily, cleansed, and replaced. This can readily be accomplished by placing the patient in the left lateral position in her bed and introducing a perineal retractor. The cervix being exposed and steadied by drawing it down with a tenaculum, the drainage-tube is caught in a pair of dressing forceps, withdrawn from the uterus, cleansed, and at once replaced. It will be perfectly easy before replacing the tube to wash out the uterus with an antiseptic solution by the aid of a Davidson's syringe with a rectal nozzle attached.

When a cancerous cervix has been removed by the aid of the curette and scissors, the tampon, which has been placed in great part to control the subsequent bleeding, should be allowed to remain for forty-eight hours, at the end of which time it may be removed. This is done with the patient lying in the left lateral position in her bed; the vagina and wound are then cleansed and disinfected, and a fresh tampon replaced, provided there be any signs of bleeding. If there be no bleeding, a single strip of gauze to provide for drainage is all that will be required. This should be renewed daily after each antiseptic douche.

The bladder is to be catheterized only in case of necessity, and unless there has been an operation on the anterior wall of the vagina the instrument will rarely be needed. In cases of repair of vesico-vaginal fistulæ, the bladder must be kept empty, either by frequent use of the catheter or by a self-retaining catheter for four or five days, or until such time as it is safe to allow the urine to accumulate and the bladder to empty itself. This is especially necessary where a ureter has been cut and subsequently stitched into the bladder. The bowels may in all cases be opened the day following the operation; a daily passage should be secured thereafter; this holds equally good for tears of the perineum involving the sphincter. A dose or two of magnesium sulphate should be administered, and as soon as there is any manifest desire for defecation an enema should be at once given, so as to secure as easy and as soft a passage as possible. If bleeding occurs after an operation, it is best that it should be given an opportunity to stop of its own accord. This usually occurs, but should it persist, hot vaginal douches may be given, and if these do not control it, resort to a vaginal tampon may be necessary, even though it spoil the operation. The tampon should only be used as a last resort: it will rarely be needed.

Except in cases of lacerated perineum where the sphincter is involved, or in cases of recto-vaginal fistulæ, the patient may be allowed anything to eat or drink she may desire. It is just as well in these two injuries to confine the diet to such articles as will leave little residue, so that there shall be as small an amount of fecal matter as possible. It will not be necessary to restrict the diet for more than four or five days. The stitches in plastic operations should be removed on the eighth or tenth day: after which time nothing in the way of treatment is necessary, except to see that the vaginal douche be given daily and that the bodily functions act properly. If a combined operation for the repair of the cervix and perineum has been performed, great care will have to be exercised in removing the stitches from the cervix, lest the union of the perineal wound be disturbed. For this reason the stitches in the cervix at the time of operation should be allowed to remain long and should be shotted. If this precaution be observed in placing the sutures, it will be easy subsequently to remove them by making traction upon the long sutures, and thus bringing the cervix into view, requiring a minimum amount of stretching of the perineum with the perineal retractor. The patient should be placed on a table in the dorsal position for their removal. If the same precaution be observed in regard to the placing of the stitches in the perineum, no difficulty will be met with in their removal. So great is the facility with which this can be done that even the nurse can be trusted with the removal of the perineal stitches. Should there be much discharge from the parts, a bichloride-of-mercury or a permanganate-of-potash douche may be substituted for that of boracic acid, and it may be given two or three times daily. This is especially necessary in the after-treatment of *vaginal hysterectomies*.

The after-treatment of this operation is very tedious, great care in regard to details being necessary.

Once each half hour the nurse makes inspection of the vulva, to see that there is no bleeding, and every two hours the catch of the catheter, which has been introduced into the bladder, is released and the bladder evacuated. Forty-eight hours after the operation the patient is put upon the table and the forceps removed. Each pair is removed in the following way: Undoing the catch of the forceps, the operator separates the handles to a distance which indicates that the points of the instrument are a quarter

of an inch apart; then, grasping each blade of the forceps in the hands, a rocking motion from side to side is applied at the same time that gentle traction is made. After loosening the forceps and before beginning to withdraw them it may be well to wait a few minutes before removing them, to see whether bleeding takes place; if so the forceps are immediately closed again, the patient given a few drops of chloroform, the vaginal packing removed, and the bleeding point sought for and seized by forceps. The forceps having been removed, the bladder is washed out with a saturated solution of boracic acid and the self-retaining catheter withdrawn. The first dressing is not removed before a week, and is then taken away under chloroform narcosis. The vaginal dressing of sterile gauze is removed and renewed daily thereafter. Two days after the first dressing the patient is allowed to be raised in bed, and to sit up in bed after the second dressing. At the time of operating the cavity should not be irrigated, lest pus be washed up beyond possibility of removal. It is better to depend upon swabbing away all discharges with sterile gauze. During the time of the suppuration which follows the use of clamps the patient is mentally dull and sluggish; the temperature and pulse will be found slightly elevated, and there will be a loss of appetite evidenced. She is, in fact, suffering from a mild form of septic infection due to absorption of the purulent discharges from the wound. For these reasons it is the more important, in order to secure the comfort and possible safety of the patient, that greater attention be paid to local disinfection and cleanliness. Deodorizing and disinfecting vaginal douches should be used daily after the first dressing has been removed and general mild stimulation administered.

Should a *ureter* have been included in either of the ligatures or clamps during the operation, symptoms of uremia will quickly develop, and the patient in most cases will be lost. For the first few days it will be uncertain whether the patient is suffering from the shock of the operation, septicemia, or uremia. By the time the true cause of the trouble is determined with reasonable certainty the patient will probably be beyond help. The symptoms which will lead one to suspect this condition are a diminution in the quantity of urine passed, the elevation and rapidity of the pulse and temperature, the low mental condition, together with restlessness and anxious expression of the countenance,—all beginning early. The diminution of the quantity of the urine is

the only one of all these symptoms pointing directly to the kidney as the seat of the trouble; and when it is considered that the amount of urine secreted after an operation is under all circumstances exceedingly small in the first twenty-four or forty-eight hours—often being less than ten ounces in the twenty-four hours—it will be seen of how little practical value this symptom really is.

If the condition be diagnosed, the proper treatment consists in removing the clamps or ligature and freeing the ureters. Should the ureters have been cut in addition to having been clamped, their cut ends may be freed from the compressing force and turned into the vagina; if the patient recover, at a subsequent operation the ureters may be turned into the bladder or the corresponding kidney be removed. If there is any uncertainty as to which side is involved, catheterization of the ureters is our only method of determining the question. This procedure is valuable in excluding ligation of one or both ureters as a possible cause of the symptoms.

Should the *bladder* have been opened during the operation, and for any reason remain unclosed, great care should be taken not to allow any accumulation of urine. For this purpose a self-retaining catheter should be introduced, and retained in place until all chance of spontaneous closure is passed. If the opening remains permanently, subsequent operation must be made for its closure, it being treated in the interim as an ordinary case of vesico-vaginal fistula.



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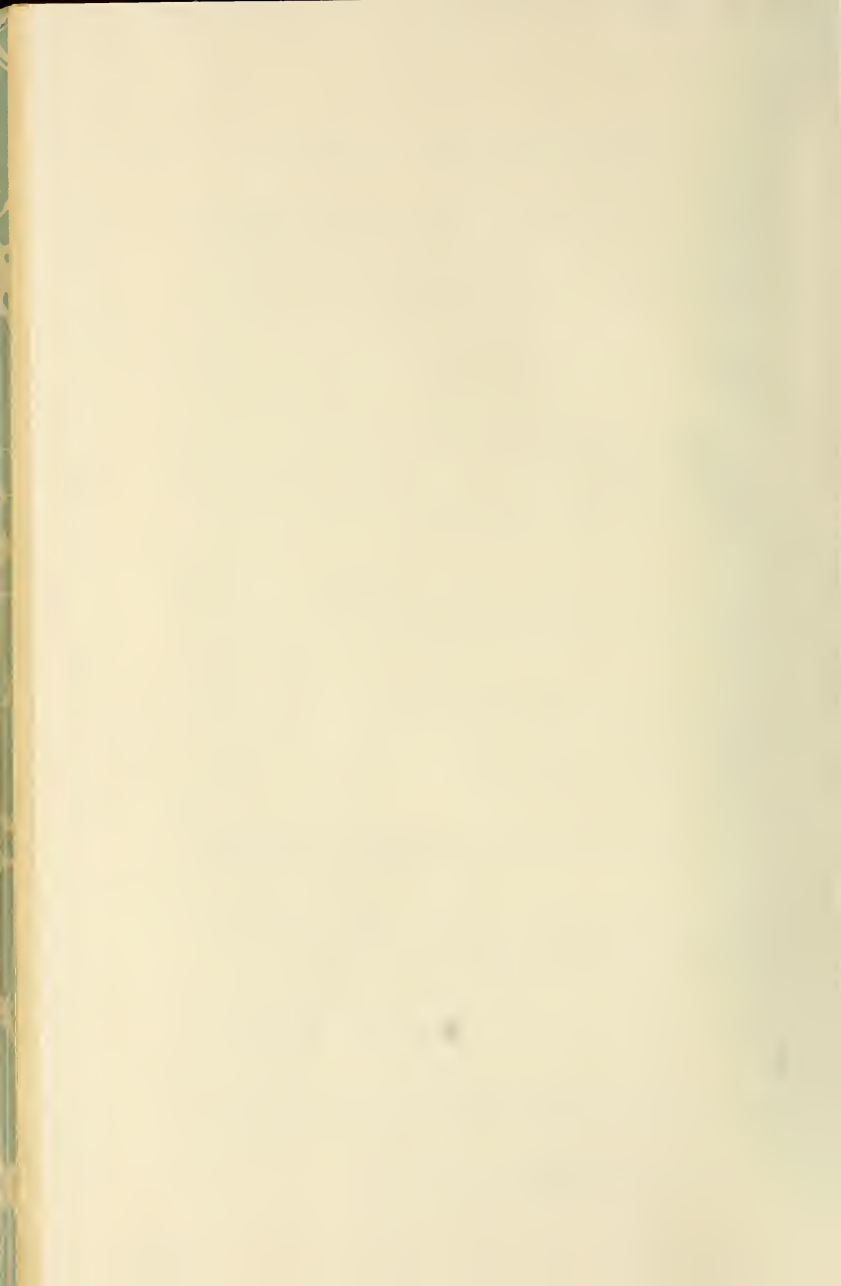
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